Sugar Bulletin, No. 11.

DEPARTMENT OF AGRICULTURE,
BRITISH GUIANA.

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FOREWORD.

BY

J. SYDNEY DASH.

FIELD EXPERIMENTS WITH SUGAR CANE, XI.

BY

C. HOLMAN B. WILLIAMS,

AND

C. CAMERON.

THE QUALITY OF BRITISH GUIANA CANE.

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THE VARIETY AND FERTILIZER POSITION OF THE SUGAR INDUSTRY, VIII.

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THE CAMERON–WILLIAMS SYSTEM FOR CANE CULTIVATION IN BRITISH GUIANA.

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FOREWORD.

This Bulletin, following the general lines of its predecessors, records work with varieties, manures and fertilizers during the period stated. In addition, it contains a review of the variety and fertilizer position in its commercial aspects, an account of studies undertaken in connection with cane quality, and an article on a new method of field practice which is gaining favour on many estates.

Dealing first with varieties, it is abundantly clear that P.O.J. 2878 has increased its popularity and now occupies nearly 70 per cent. of the total cane acreage of the Colony; Diamond 10 is rapidly receding, while D. 625 and "mixed" plantings have practically disappeared altogether. As a high-yielding, quick-covering variety, possessing as well hardiness and long ratooning qualities, the P.O.J. 2878 has made a substantial contribution to sugar estate economy in the Colony. New varieties must measure up to and exceed the performance of this outstanding cane. In this connection, there are six seedlings—four of local breeding and two from India—which justify extension. The planting community recognises their merits, since they offer a choice for practically every local situation. These varieties are D. 14/33, D. 419/33, D. 14/34, D. 166/34, Co. 419 and Co. 421.

The manurial work reported further emphasises the advantages of at least four cwt. per acre of ammonium sulphate for all ratoons on flood-fallowed frontland, and the need for even heavier dressings on pegassy clay. So long as the fertilizer is available, those estates which now use only three cwt. per acre would be well advised to increase the rate. War conditions have brought about the use of calcium cyanamide (granular aero-cyanamid), and in a considerable number of tests it has proved the equal of ammonium sulphate. Importations of cynanamide have increased considerably.

The work with phosphates, while indicating a number of areas, especially on pegassy clay, where phosphatic manuring is very desirable, has stressed the need for more research aimed at discovering means of recognising 'responding' areas by laboratory methods, since there appears to be no direct connection between 'available' phosphate content and response. A close study of samples from 'responding' and 'non-responding' areas might indicate the rôle played by active alumina and/or organic matter. It is obviously not a simple problem and may require prolonged application.

The investigations with organic manures deserve more than passing notice for their rational use in this Colony has been the rare exception rather than the rule. It seems clear that they form a satisfactory substitute for ammonium

sulphate and will readily supply the desired phosphate where this element gives a response. Under war conditions, both these findings are very important and it is desirable that a serious and sustained effort be directed towards obtaining the maximum amount of organic manure possible from factory residues and the present animal population of the estates. The planters in this Colony have always shown themselves resourceful and alert in pursuing new methods and doubtless will be able to devise ways and means of further developing the use of organic residues both of plant and animal origin.

Finally, there is much of practical interest and value in the article on cane quality and in the cultivation method described by Messrs. Cameron and Williams. Both should have important effects on the Colony's sugar output.

J. SYDNEY DASH,
Director of Agriculture.

FIELD EXPERIMENTS WITH SUGAR CANE, XI.

BY

C. HOLMAN B. WILLIAMS, *Sugar Agronomist and Plant Breeder,*

AND

C. CAMERON, *Field Manager.*

INTRODUCTION.

This paper records the results of 31 variety and 36 manurial trials reaped during the year ended June 30, 1942. As in previous years, the layouts (randomised blocks, latin squares, factorial) have permitted the analysis of variance.

The analyses of the soils of the manurial trial sites appear in Appendix I.

In the tables showing the results of individual variety tests, the data from canes which have done poorly, and have been discarded, are not printed, but in reading the tables it must be borne in mind that such data were used in calculating the means, statistical analyses, &c.

It will be seen from the Table below that the total rainfall for the period was somewhat above the normal. September 1941 was, however, very dry and the precipitation was continuously sub-normal from December 1941 to March 1942.

Comparison of the July—June Rainfall at Sophia Sugar Experiment Station for 1941—42 with the Average for 1921—41.

Month.	Actual Rainfall, 1941—42, in.	Average Rainfall, 1921—41, in.	Excess or Deficit, in.
July	13.05	11.16	1.89
August	13.85	8.46	5.39
September	1.32	2.62	−1.30
October	9.37	4.04	5.33
November	8.04	5.51	2.53
December	10.70	13.42	−2.72
January	3.36	8.89	−5.53
February	1.90	3.95	−2.05
March	2.81	4.44	−1.63
April	9.48	5.37	4.11
May	11.13	11.16	−0.03
June	17.17	14.40	2.77
Total	102.18	93.42	8.76

Grateful thanks are expressed to the Staffs of the Sugar Estates for their hearty co-operation.

VARIETY TRIALS.

The variety trials are considered under four sub-sections, *viz*:—

(a) Plant cane variety trials;

(b) First ratoon variety trials;

(c) Second and third ratoon variety trials;

(d) Discussion and summary.

SUB-SECTION A.—PLANT CANE VARIETY TRIALS.

Plant Cane Variety Trials Reaped at Sophia Sugar Experiment Station.

Data from the four plant cane variety trials reaped at the Sophia Sugar Experiment Station are presented in Table I and Figures I and II.

Fig. I.—Yields from Plant Canes at Sophia.

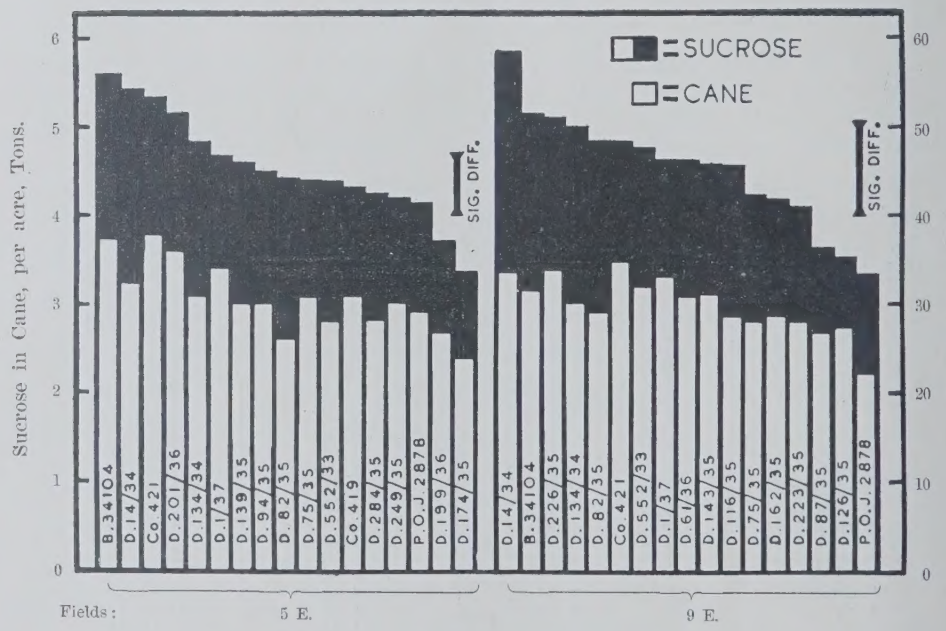


TABLE I.—Results of Plant Cane Variety Trials Reaped at Sophia Sugar Experiment Station.

	Variety.	Cane per Acre, Tons.	Pol. % Cane.	Glucose Ratio.	Purity.	Sucrose in Cane per Acre, Tons.	Sucrose in Cane per Acre, % Mean.
		Sophia, Field 5 E. Reaped 25.iii.42 at 13.25 months.					
MEANS OF 5 PLOTS:	B. 34104	37.06	15.09	3.41	93.1	5.59	134.37
	D. 14/34	32.36	16.78	3.17	92.3	5.43	130.53
	Co. 421	37.75	14.16	3.74	87.4	5.34	128.37
	D. 201/36	35.96	14.30	5.82	86.0	5.14	123.56
	D. 134/34	30.91	15.61	3.06	90.3	4.83	116.11
	D. 1/37	34.08	13.73	4.93	89.8	4.68	112.50
	D. 139/35	30.22	15.21	4.58	88.8	4.60	110.58
	D. 94/35	30.25	14.89	4.88	90.2	4.51	108.41
	D. 82/35	26.24	16.85	4.20	91.4	4.42	106.25
	D. 75/35	30.73	14.35	4.82	88.8	4.41	106.01
	D. 552/33	27.95	15.75	3.31	90.5	4.40	105.77
	Co. 419	30.93	14.01	4.89	85.7	4.33	104.09
	D. 284/35	28.31	15.06	4.65	88.6	4.26	102.40
	D. 249/35	30.21	13.94	6.92	85.9	4.21	101.20
	P.O.J. 2878	29.28	14.21	3.76	88.3	4.16	100.00
	D. 199/36	26.73	13.93	5.97	87.3	3.72	89.42
	D. 174/35	23.89	14.12	6.31	85.0	3.37	81.01
	D. 89/35	23.05	14.45	4.68	87.4	3.33	80.05
	*Mean:					4.16	100.00
	Significant Difference, 20 : 1:					0.73	17.55
		Sophia, Field 9 E. Reaped 19.iii.42 at 13.25 months.					
MEANS OF 5 PLOTS:	D. 14/34	33.64	17.39	3.65	92.6	5.85	133.56
	B. 34104	31.49	16.36	3.31	92.6	5.15	117.58
	D. 226/35	33.79	15.10	5.34	91.7	5.10	116.44
	D. 134/34	30.16	16.58	5.43	92.1	5.00	114.16
	D. 82/35	29.08	16.66	4.33	92.3	4.84	110.50
	Co. 421	34.88	13.89	4.92	88.7	4.84	110.50
	D. 552/33	31.98	14.91	5.06	89.6	4.77	108.90
	D. 1/37	33.09	14.03	5.89	88.6	4.64	105.94
	D. 61/36	30.82	15.01	6.59	90.6	4.63	105.71
	D. 143/35	31.09	14.75	6.80	88.5	4.59	104.79
	D. 116/35	28.55	15.94	4.64	93.1	4.55	103.88
	D. 75/35	28.10	15.09	4.83	91.1	4.24	96.80
	D. 162/35	28.67	14.58	4.74	88.4	4.18	95.43
	D. 223/35	28.20	14.55	5.77	92.4	4.10	93.61
	D. 87/35	26.70	13.63	4.71	89.3	3.64	83.10
	D. 126/35	27.40	12.85	7.86	86.5	3.52	80.37
	P.O.J. 2878	22.19	15.06	5.63	88.8	3.34	76.26
	*Mean:					4.38	100.00
	Significant Difference, 20 : 1:					1.07	24.43
		Sophia, Field 11 E. Reaped 24. iii.42 at 13.25 months.					
MEANS OF 5 PLOTS:	Co. 421	31.44	16.17	4.33	91.9	5.09	122.65
	D. 94/35	29.43	17.19	4.42	91.5	5.06	121.93
	D. 163/35	28.47	16.15	5.34	90.2	4.60	110.84
	D. 116/35	27.64	16.53	4.55	90.8	4.57	110.12
	D. 82/35	25.54	17.76	4.28	90.9	4.53	109.16
	D. 199/36	31.14	14.52	7.55	86.6	4.52	108.92
	D. 552/33	27.15	16.49	5.23	90.9	4.48	107.95
	D. 143/35	27.38	16.14	6.48	89.7	4.42	106.51
	B. 34104	27.31	16.05	6.34	91.1	4.38	105.54
	P.O.J. 2878	27.06	16.15	5.65	86.4	4.37	105.30
	D. 162/35	24.75	17.05	5.10	87.9	4.22	101.69
	D. 166/34	24.58	16.96	4.19	89.9	4.17	100.48
	D. 68/35	26.03	15.22	5.58	88.7	3.96	95.42
	D. 92/35	23.54	16.41	5.30	90.0	3.87	93.25
	D. 249/35	24.13	15.95	8.26	86.3	3.85	92.77
	D. 419/33	23.14	15.66	6.31	86.7	3.62	87.23
	Co. 419	24.51	13.83	6.42	86.0	3.39	81.69
	*Mean:					4.15	100.00
	Significant Difference, 20 : 1:					0.73	17.59

*See Introduction, p. 1.

TABLE I (Contd.)—**Results of Plant Cane Variety Trials Reaped at Sophia Sugar Experiment Station.**

	Variety.	Cane per Acre, Tons.	Pol. % Cane.	Glucose Ratio.	Purity.	Sucrose in Cane per Acre, Tons.	Sucrose in Cane per Acre, % Mean.
		Sophia, Field 7 W. Reaped 18.xi.41 at 11.25 months.					
MEANS OF 4 PLOTS:	Co. 421	22.53	15.89	3.26	88.3	3.58	116.61
	D. 14/34	18.52	17.84	2.65	91.6	3.30	107.49
	D. 14/33	20.50	16.02	2.71	90.2	3.28	106.84
	D. 200/36	22.05	14.10	4.18	86.7	3.11	101.30
	D. 1/37	20.51	15.02	3.36	89.4	3.08	100.33
	P.O.J. 2878	17.43	15.31	3.28	89.7	2.67	86.97
	*Mean:					3.07	100.00
	Significant Difference, 20 : 1:					0.68	22.15

*See Introduction, p. 1.

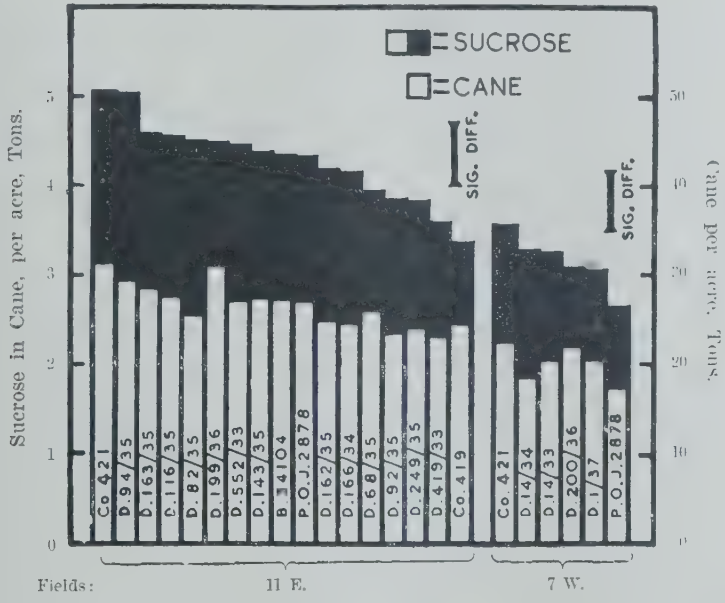
In Field 5 E., tonnages were fair for Sophia and the cane was of good quality. Of the fourteen varieties outyielding the standard, the first four led by statistically significant margins and the fifth just missed significance. B. 34104 (Co. 281 x B.H.10/12) is not yet sufficiently tested but shows promise as a heavy yielder of high quality cane. It has been included in several new experiments and will be watched with interest. D. 14/34 (Co. 281 x Diamond 10), which came a close second to B. 34104, outyielded the Barbados cane by a wide margin in Field 9 E. This cane appears to be consistently better than P.O.J. 2878 both in respect to tonnage and quality. Co. 421 (P.O.J. 2878 x B. 3412) has distinguished itself in every experiment in which it has appeared and, if its high fibre content be not too great a handicap, it seems destined to play an important part in local sugar production. D. 201/36 (P.O.J. 2878 x Co. 213) and D. 134/34 (D. 51/30 x Diamond 10) must be tested further but their early returns are quite promising. D. 552/33 (D. 219/30 x Diamond 10) is, on the whole, a better yielder than P.O.J. 2878, but it is doubtful if it will outyield D. 166/34, D. 14/34 or Co. 421. Co. 419 (P.O.J. 2878 x Co. 290) occupies an unusually low place in this test. Most of the other varieties above the standard are being tested further.

In Field 9 E., tonnages were average for Sophia and the cane quality high. The standard, P.O.J. 2878, came last of all the varieties tried and was definitely inferior to the first eleven on the list. D.14/34 (Co. 281 x Diamond 10) was significantly better than all the varieties below Co. 421, and, in view of this and other similar results it is being distributed to the estates. B. 34104 (Co. 281 x B.H. 10/12), D. 134/34 (D. 51/30 x Diamond 10) and Co. 421 (P.O.J. 2878 x B. 3412) also distinguished themselves in Field 5 E., Sophia; enough is known of the last to warrant commercial tests, but the two former and the best of the remaining varieties in the list are being tested further.

In Field 11 E., Co. 421 (P.O.J. 2878 x B. 3412) was again outstanding and D. 94/35 (D. 666/18 x D. 66/30) a close second. The latter has not yet been sufficiently tested but it will be given full consideration, especially in view of its high juice quality. An unexpected feature is the relatively low positions held by B. 34104 (Co. 281 x B.H. 10/12), D. 166/34 (P.O.J. 2878 x Sorghum), D. 419/33 (Co. 281 x Diamond 10) and Co. 419 (P.O.J. 2878 x Co. 290). It should be noted that D. 82/35 (D. 13/30 x Diamond 10), which is being further tested as a result of promising indications in earlier trials, has consistently outyielded the standard in this and the two experiments discussed above.

In Field 7 W., yields were very low. Nevertheless, five varieties, which have been generally better than the standard, maintained their expected lead. Co. 421 (P.O.J. 2878 x B. 3412) was significantly better than the standard and the second and third places were held by two very promising Co. 281 x Diamond 10 crosses, *viz.* D. 14/34 and D. 14/33. As usual, both yielded cane of very high quality.

FIG. II.—**Yields from Plant Canes at Sophia.**



Plant Cane Variety Trials Reaped in East Demerara.

The results of seven plant cane variety trials harvested in East Demerara appear in Table II and Figure III.

TABLE II.—**Results of Plant Cane Variety Trials Reaped in East Demerara.**

	Variety.	Cane per Acre. Tons.	Pol. % Cane.	Glucose Ratio.	Purity.	Sucrose in Cane per Acre. Tons.	Sucrose in Cane per Acre. % Mean.
	Pln. Cane Grove, Field 35 U. Reaped 29.v.42 at 14.75 months.						
Means of 3 Plots:	D. 79/36	32.45	12.75	7.30	87.8	4.14	126.22
	D. 199/36	27.84	12.29	8.44	86.2	3.42	104.27
	P.O.J. 2878	21.86	13.40	6.83	86.3	2.93	89.33
	*Mean:					3.28	100.00
	Significant Difference, 20: 1:					—	—
	Pln. Enmore, Field 14 E.E. Reaped 15.v.42 at 15.00 months.						
Means of 5 Plots:	Co. 421	40.51	11.82	7.12	83.3	4.79	115.14
	D. 166/34	34.61	12.98	6.68	85.2	4.49	107.93
	D. 419/33	31.70	13.50	6.78	83.5	4.28	102.88
	P.O.J. 2878	33.99	12.00	8.76	82.0	4.08	98.08
	Co. 419	23.36	10.68	10.40	77.4	3.14	75.48
	*Mean:					4.16	100.00
	Significant Difference, 20: 1:					0.52	12.50
	Pln. Lusignan, Field 17 G.H. Reaped 26.iii.42 at 13.75 months.						
Means of 5 Plots:	D. 14/34	36.15	15.92	5.02	90.4	5.76	130.32
	Co. 421	32.44	14.00	6.17	88.5	4.54	102.71
	P.O.J. 2878	28.83	14.13	6.82	87.0	4.07	92.08
	D. 199/36	30.55	12.69	12.45	83.0	3.88	87.78
	Co. 419	30.91	12.44	10.59	82.1	3.85	87.10
	*Mean:					4.42	100.00
	Significant Difference, 20: 1:					0.55	12.44
	Pln. Ogle, Field 29 L. Reaped 19.iii.42 at 13.50 months.						
Means of 5 Plots:	D. 14/34	47.92	16.57	4.44	92.0	7.94	116.08
	Co. 421	51.77	14.60	5.81	86.1	7.56	110.53
	P.O.J. 2878	41.18	14.48	7.26	85.7	5.96	87.13
	D. 552/33	38.92	15.12	5.15	88.5	5.88	85.96
	Mean:					6.84	100.00
	Significant Difference, 20: 1:					0.77	11.26
	Pln. Providence, Field 42 R.P. Reaped 17.x.41 at 13.25 months.						
Means of 5 Plots:	D. 166/34	38.58	15.63	6.65	89.3	6.03	124.07
	P.O.J. 2878	39.21	15.37	7.34	87.4	6.03	124.07
	D. 54/37	40.10	13.06	12.30	84.5	5.24	107.82
	*Mean:					4.86	100.00
	Significant Difference, 20: 1:					0.65	13.37

*See Introduction, p. 1.

TABLE II (Contd.).—**Results of Plant Cane Variety Trials Reaped in East Demerara.**

	Variety.	Cane per Acre, Tons.	Pol. % Cane.	Glucose Ratio.	Purity.	Sucrose in Cane per Acre, Tons.	Sucrose in Cane per Acre, % Mean.
	Pln.	*Providence.*	*Field 77 P.*	*H. Reaped*	*12.iii.42 at*	*13.00 months.*	
MEANS OF 5 PLOTS:	Co. 421	42.81	14.71	4.02	87.4	6.30	108.06
	D. 552/33	38.96	15.16	7.38	87.0	5.91	101.37
	D. 199/36	46.22	12.77	11.59	82.8	5.90	101.20
	P.O.J. 2878	40.92	13.84	8.96	84.8	5.66	97.08
	*Mean:					5.83	100.00
	Significant Difference, 20: 1:					—	—
	Pln.	*Farm, Field 9/11 H.*		*P. Reaped*	*29.iv.42 at*	*14.50 months.*	
MEANS OF 5 PLOTS:	Co. 421	49.42	13.33	6.52	89.4	6.59	126.97
	D. 199/36	38.05	13.92	7.28	90.4	5.30	102.12
	P.O.J. 2878	40.57	12.63	7.37	84.9	5.12	98.65
	*Mean:					5.19	100.00
	Significant Difference, 20: 1:					1.17	22.54

*See Introduction, p. 1.

In Field 35 U., Cane Grove, the area consists of a rather difficult and infertile soil on which even P.O.J. 2878 is unsatisfactory, and the performance of D. 79/36 (D. 49/30 x Diamond 10) was very pleasing.

In Field 14 E. E., Enmore, harvest was unavoidably delayed until the canes were overripe and there was a good deal of rotten cane, especially in Co. 419 (P.O.J. 2878 x Co. 290) which, under these conditions, was definitely inferior to all the other canes in the test. Co. 421 (P.O.J. 2878 x B. 3412) led P.O.J. 2878 by a statistically significant margin but was not definitely better than D. 166/34 (P.O.J. 2878 x Sorghum), which yielded cane of better quality. D. 419/33 (Co. 281 x Diamond 10) is normally an excellent ratooner and should improve its margin over P.O.J. 2878 in later harvests.

In Field 17 G. H., Lusignan, D. 14/34 (Co. 281 x Diamond 10) led its nearest competitor, Co. 421 (P.O.J. 2878 x B. 3412), by a margin which more than doubled the significant difference. It was superior to all the other canes tested there both in tonnage and quality. It is possible that the Co. 419 (P.O.J. 2878 x Co. 290) was somewhat overripe at 13.75 months.

In Field 29 L., Oe^{1}2, D. 14/34 (Co. 281 x Diamond 10) and Co. 421 (P.O.J. 2878 x B 3412) led the standard by statistically significant margins. The excellent quality of the cane from D. 14/34 permitted it to surpass the Indian cane despite the slightly heavier tonnage of the latter. There was little to choose between the standard and D. 552/33 (D. 219/30 x Diamond 10).

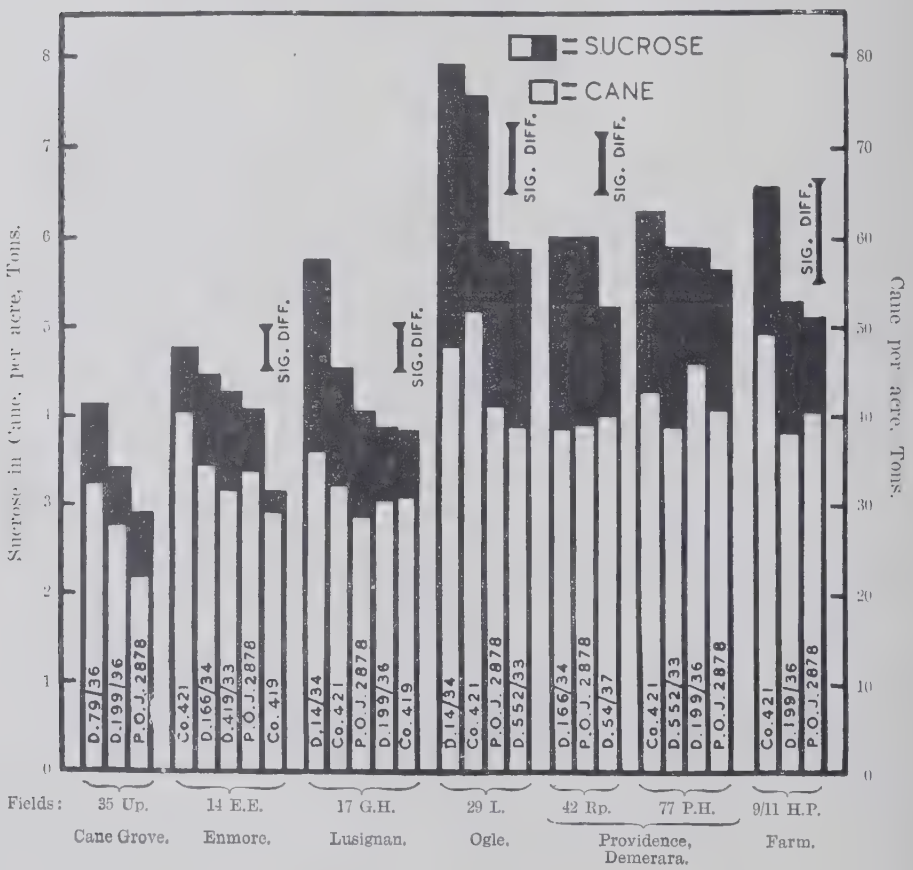
In Field 42 R.P., Providence, Demerara, D. 166/34 (P.O.J. 2878 x Sorghum) gave the same sucrose yield as the standard, being slightly

lower in tonnage but somewhat better in juice quality. P.O.J. 2878 was significantly better than any of the 1937 seedlings tried in this experiment.

In Field 77 P.H., Providence, Demerara, the differences in yield between the different varieties did not exceed the limits of chance fluctuations, but Co. 421 (P.O.J. 2878 x B. 3412) was, as frequently, at the top of the list. D. 199/36 (P.O.J. 2878 x Co. 213) yields a heavy tonnage of mediocre-quality cane.

In Field 9/11 H.P., Farm, Co. 421 (P.O.J. 2878 x B. 3412) led all competitors by a statistically significant margin. The field was somewhat old at harvest and there was some rotten cane. D. 199/36 (P.O.J. 2878 x Co. 213) appears to have benefited, as regards juice quality, by the delay, for it is not usual for the quality of its cane to surpass that of P.O.J. 2878.

FIG. III.—**Yields from Plant Canes at Plns. Cane Grove, Enmore, Lusignan, Ogle, Providence (Demerara) and Farm.**



Plant Cane Variety Trials Reaped in West Demerara.

Table III and Figure IV present the results of the three plant cane variety trials harvested in West Demerara.

Table III.—**Results of Plant Cane Variety Trials Reaped in West Demerara.**

	Variety.	Cane per Acre, Tons.	Pol. % Cane.	Glucose Ratio.	Purity.	Sucrose in Cane per Acre. Tons.	Sucrose in Cane per Acre. % Mean.
	Pln. Wales, Field 27 L. Reaped 29.x. 41 at 14.00 months.						
Means of 5 Plots:	D. 166/34	50.53	16.55	4.27	92.1	8.36	141.94
	D. 50/37	43.62	15.49	4.46	91.5	6.76	114.77
	D. 49/37	46.55	14.31	5.09	89.7	6.66	113.07
	P.O.J. 2878	43.51	14.13	8.34	89.3	6.15	104.41
	D. 41/37	38.34	15.22	6.40	90.8	5.84	99.15
	*Mean:					5.89	100.00
	Significant Difference, 20 : 1:					1.03	17.40
	Pln. Leonora, Field 83 L. Reaped 27.viii. 41 at 13.75 months.						
Means of 5 Plots:	P.O.J. 2878	39.28	14.00	12.02	86.9	5.50	113.64
	D. 10/36	37.54	13.71	8.44	88.8	5.15	106.40
	D. 79/36	39.60	12.56	13.74	85.5	4.97	102.69
	D. 68/36	37.95	12.81	10.79	88.0	4.86	100.41
	D. 2/36	38 72	11.94	10.65	86.4	4.62	95.45
	D. 52/36	36,10	12.48	10.59	87.7	4.50	92.98
	D. 7/36	35.70	12.01	9.39	87.3	4.29	88.64
	Mean:					4.84	100.00
	Significant Difference, 20 : 1					0.67	13.84
	Pln. Leonora, Field 61 Sv. Reaped 26.viii. 41 at 13.75 months.						
Means of 5 Plots:	D. 10/36	29.73	15.07	11.91	89.3	4.48	123.42
	D. 79/36	29.41	14.12	20.45	84.7	4.15	111.32
	D. 7/36	23.20	13.31	15.34	87.6	3.09	85.12
	P.O.J. 2878	21.43	13.06	14.64	84.6	2.80	77.13
	Mean:					3.63	100.00
	Significant Difference, 20 : 1:					0.52	14.32

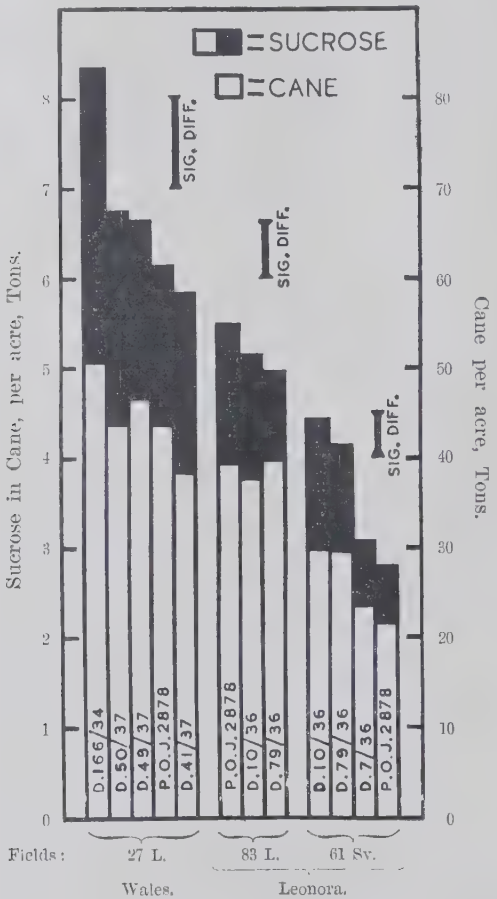
*See Introduction, p. 1.

In Field 27 L., Wales, D. 166/34 (P.O.J. 2878 x Sorghum) was significantly better than all competitors and gave a heavy yield of very high quality cane. This experimental result was confirmed by the commercial returns from a considerable acreage of this cane in this and adjacent fields. None of the 1937 seedlings was very outstanding, but some further consideration will be given to the three highest on the list.

In Field 83 L., Leonora, the standard cane topped the list and it is doubtful if any of the others will compete with it on this soil type.

In Field 61 Sv., Leonora, both D. 10/36 (D. 456/33 x D. 66/30) and D. 79/36 (D. 49/30 x Diamond 10), which were second and third in the test in Field 83 L., Leonora, led the standard by statistically significant margins, and deserve further consideration. D. 79/36 gave a good return under very difficult conditions in Field 35 U., Cane Grove.

FIG. IV.—**Yields from Plant Canes at Plns. Wales and Leonora.**



SUB-SECTION B.—FIRST RATOON VARIETY TRIALS.

First Ratoon Variety Trials Reaped at Sophia Sugar Experiment Station.

The results of the three first ratoon variety trials reaped at the Sophia Sugar Experiment Station are presented in Table IV and Figure V.

Table IV.—Results of First Ratoon Variety Trials Reaped at Sophia Sugar Experiment Station.

	Variety.	Cane per Acre, Tons.	Pol. % Cane.	Glucose Ratio.	Purity.	Sucrose in Cane per Acre, Tons.	Sucrose in Cane per Acre, % Mean.	Combined Results for 2 Crops, Plants and 1st Ratoons. Variety.	Combined Results for 2 Crops, Plants and 1st Ratoons. Sucrose in Cane per Acre, Tons.
		Sophia,	*Field*	*10 E.*	*Reaped*	*22.ix.41*	*at 11.50*	*months.*	
Means of 5 Plots:	P.O.J. 2878	26.14	13.82	4.08	85.8	3.61	115.71	P.O.J. 2878	6.21
	D. 249/35	30.23	11.16	7.69	81.3	3.37	108.01	D. 249/35	6.15
	*Mean:					3.12	100.00		
	Significant Difference, 20 : 1 :					0.68	21.79		
		Sophia,	*Field*	*5 W.*	*Reaped*	*29.x.41*	*at 12.75*	*months.*	
Means of 5 Plots:	D. 14/34	38.70	14.54	4.52	89.2	5.63	127.09	D. 14/34	9.57
	D. 199/36	33.91	12.18	9.07	86.6	4.13	93.23	D. 199/36	7.54
	P.O.J. 2878	23.84	14.83	5.36	88.5	3.54	79.91	P.O.J. 2878	6.43
	Mean:					4.43	100.00		
	Significant Difference, 20: 1:					0.68	15.35		
		Sophia,	*Field*	*12 W.*	*Reaped*	*20.x.41*	*at 12.50*	*months.*	
Means of 5 Plots:	D. 200/36	26.79	14.26	5.81	88.7	3.82	130.82	D. 200/36	8.64
	D. 174/35	21.07	14.20	6.36	88.7	2.99	102.40	D. 174/35	6.54
	P.O.J. 2878	15.83	12.39	8.40	85.6	1.96	67.12	P.O.J. 2878	4.98
	*Mean:					2.92	100.00		
	Significant Difference, 20: 1:					0.59	20.20		

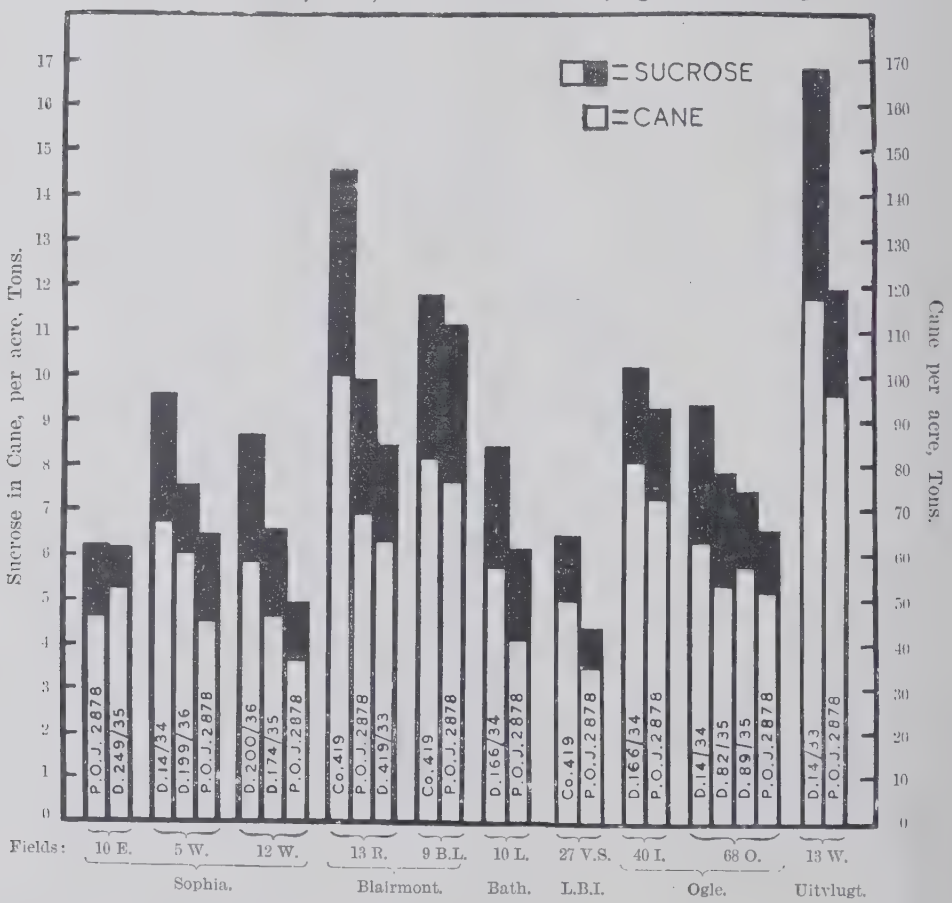
*See Introduction, p. 1.

In Field 10 E., Sophia, the standard cane gave the best first ratoon return and headed the list in total yield for two crops. D. 249/35 (D. 171/29 x Diamond 10), which came a close second in total yield for two harvests gives high tonnages but the quality of its cane is not satisfactory.

In Field 5 W., Sophia, D. 14/34 (Co. 281 x Diamond 10) maintained its plant cane promise and outyielded the standard by more than thrice the significant difference. In total yield for two crops it surpassed P.O.J. 2878 by more than three tons of sucrose per acre. D. 199/36 (P.O.J. 2878 x Co. 213) frequently leads P.O.J. 2878, but on the whole its cane is mediocre in quality.

In Field 12 W., Sophia, the first ratoon yield of D. 200/36 (P.O.J. 2878 x Co. 213), which also headed the plant cane list, surpassed that of P.O.J. 2878 by more than three times the significant difference; in total yield for two crops the increment in favour of D. 200/36 amounts to 3.66 tons of sucrose per acre. D. 174/35 (D. 49/30 x D. 66/30) has given some promising results but it is doubtful if it can compete with D. 200/36 or D. 14/34. It is of interest to note that samples were taken from this field when the canes were 11.5 months of age and that the juice purities were similar to those recorded at harvest, but that whereas the sucrose content of D. 200/36 showed a slight improvement in the interval, that of P.O.J. 2878 deteriorated. This supports local opinion that P.O.J. 2878 is an early ripener.

FIG. V.—**Yields from Plant Canes and First Ratoons at Sophia, Plns. Blairmont, Bath, La Bonne Intention, Ogle and Uitvlugt.**



First Ratoon Variety Trials Reaped in Berbice, East and West Demerara.

The results of seven first ratoon variety trials reaped in Berbice and East and West Demerara appear in Table V and Figure V.

Table V.—Results of First Ratoon Variety Trials Reaped in Berbice, East and West Demerara.

	Variety.	Cane per Acre, Tons.	Pol. % Cane.	Glucose Ratio.	Purity.	Sucrose in Cane per Acre, Tons.	Sucrose in Cane per Acre, % Mean.	Combined Results for 2 Crops, Plants and 1st Ratoons. Variety.	Sucrose in Cane per Acre, Tons.
	P.n.	*Blair*	*mont,*	*Field 13*	*R. Rea*	*ped 15.*	*viii.41*	*at 11.00*	*months.*
Means of 5 Plots:	Co. 419	41.01	15.78	7.88	91.0	6.47	130.97	Co. 419	14.58
	P.O.J. 2878	28.19	14.90	7.99	90.4	4.20	85.02	P.O.J. 2878	9.91
	D. 419/33	29.32	14.19	7.03	89.8	4.16	84.21	D. 419/33	8.49
	Mean:					4.94	100.00		
	Significant Difference, 20 : 1:					0.20	4.05		
	Pln.	*Blair*	*mont,*	*Field 9*	*B.L. Re*	*aped 15.*	*iv.42 at*	*12.25 mon*	*ths.*
Means of 5 Plots:	Co. 419	36.01	13.50	6.70	87.0	4.86	104.74	Co. 419	11.79
	P.O.J. 2878	32.32	13.69	6.57	87.2	4.42	95.26	P.O.J. 2878	11.13
	Mean:					4.64	100.00		
	Significant Difference, 20 : 1:					—	—		
		Pln.	*Bath,*	*Field 10*	*L. Reap*	*ed 20.xi.*	*41 at 11.*	*50 months*	
Means of 5 Plots:	D. 166/34	33.06	15.37	3.51	91.0	5.08	108.79	D. 166/34	8.45
	P.O.J. 2878	28.10	15.18	3.89	87.9	4.26	91.22	P.O.J. 2878	6.19
	Mean:					4.67	100.00		
	Significant Difference, 20 : 1:					0.71	15.20		
	Pln. La	*Bonne*	*Intentio*	*n, Field*	*27 V.S.*	*Reaped*	*26.viii.*	*41 at 11.25*	*months.*
Means of 5 Plots:	Co. 419	28.95	14.24	5.27	88.1	4.12	114.76	Co. 419	6.45
	P.O.J. 2878	21.79	14.04	6.48	85.9	3.06	85.24	P.O.J. 2878	4.36
	Mean:					3.59	100.00		
	Significant Difference, 20 : 1:					0.37	10.31		
		Pln.	*Ogle, Fi*	*eld 40 I.*	*Reaped*	*18.ix.41*	*at 11.50*	*months.*	
Means of 5 Plots:	D. 166/34	38.42	13.60	4.98	87.9	5.22	103.16	D. 166/34	10.14
	P.O.J. 2878	33.96	14.44	4.56	87.6	4.90	96.84	P.O.J. 2878	9.29
	Mean:					5.06	100.00		
	Significant Difference, 20 : 1:					—	—		
		Pln.	*Ogle, Fi*	*eld 68 O.*	*Reaped*	*23.xii.41*	*at 12.75*	*months.*	
Means of 5 Plots:	D. 14/34	34.07	14.77	3.62	89.2	5.03	122.98	D. 14/34	9.38
	D. 82/35	28.36	15.10	3.68	89.1	4.28	104.65	D. 82/35	7.86
	P.O.J. 2878	26.25	12.74	4.12	85.0	3.34	81.66	P.O.J. 2878	6.54
	*Mean:					4.09	100.00		
	Significant Difference, 20 : 1					0.62	15.16		
	Pln. U	*itvlugt,*	*Field*	*13 W.*	*Reaped*	*11.xii.41*	*at 12.*	*50 months.*	
Means of 5 Plots:	D. 14/33	61.02	15.24	4.15	91.7	9.30	130.62	D. 14/33	16.81
	P.O.J. 2878	51.45	12.76	7.14	84.0	6.56	92.13	P.O.J. 2878	11.94
	*Mean:					7.12	100.00		
	Significant Difference, 20 : 1:					0.55	7.72		

*See Introduction, p. 1.

In Field 13 R., Blairmont, Co. 419 (P.O.J. 2878 x Co. 290) gave a heavy crop and led all competitors, in no uncertain manner, both as a first ratoon and in total yield for two crops. D. 419/33 (Co. 281 x Diamond 10) got a bad start in this test and gave a poor plant cane yield. Despite this handicap, however, it gave practically the same first ratoon return as the standard. The quality of all the canes, at 11 months of age, was high.

In Field 9 B. L., Blairmont, Co. 419 (P.O.J. 2878 x Co. 290) enhanced, as a first ratoon, its slight plant cane advantage over P.O.J. 2878, but the difference is not statistically significant.

In Field 10 L., Bath, D. 166/34 (P.O.J. 2878 x Sorghum) maintained its plant cane advantage as a first ratoon, leading P.O.J. 2878 by a statistically significant margin and by more than two tons of sucrose per acre in total yield for two crops.

In Field 27 V. S., La Bonne Intention, Co. 419 (P.O.J. 2878 x Co. 290) was again definitely better than the standard which it now leads by more than two tons of sucrose in total yield for two crops.

In Field 40 I., Ogle, D. 166/34 (P.O.J. 2878 x Sorghum) has been superior to the standard both as plants and first ratoons.

In Field 68 O., Ogle, D. 14/34 (Co. 281 x Diamond 10) ratooned definitely better than all competitors and in total yield for two crops it now surpasses the standard by 2.84 tons of sucrose per acre. Its cane in this test was of high quality. D. 82/35 (D. 13/30 x Diamond 10) has some other promising results to its credit and is being further tested.

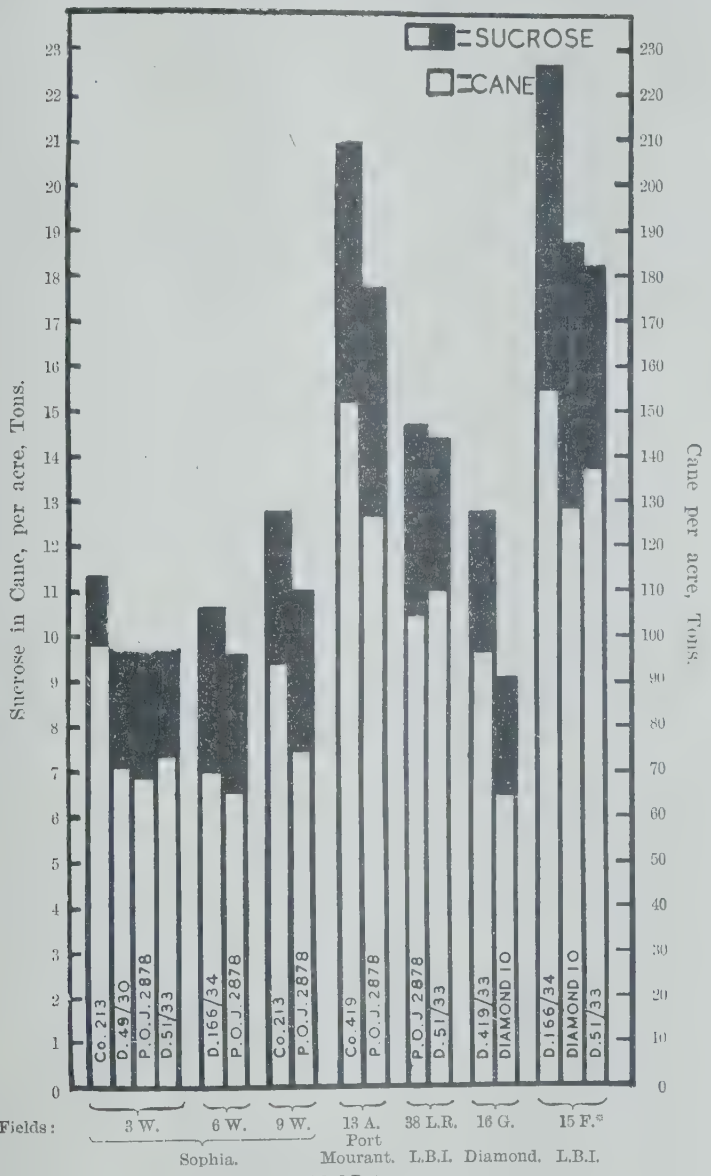
In Field 13 W., Uitvlugt, the high yields belied the common belief that an unusually heavy crop is followed by a light one, for both in the plants and the first ratoons the returns were very excellent. D. 14/33 (Co. 281 x Diamond 10), which was so markedly better than the standard as a plant cane, surpassed it as a first ratoon by practically five times the significant difference of the experiment, and is now 4.87 tons of sucrose per acre ahead of P.O.J. 2878 in total yield for two crops.

SUB-SECTION C.—SECOND AND THIRD RATOON VARIETY TRIALS.

Second Ratoon Variety Trials Reaped at Sophia Sugar Experiment Station and Berbice and Second and Third Ratoon Variety Trials Reaped in East Demerara.

Table VI and Figure VI present the results from three second ratoon variety trials reaped at Sophia Sugar Experiment Station, one at Berbice and two at East Demerara, as well as from one third ratoon test at the last-named.

FIG. VI.-- **Yields from Plant Canes, First and Second Ratoons at Sophia, Plns. Port Mourant, La Bonne Intention and Diamond.**



* Total for 4 Crops, Plants, 1st, 2nd and 3rd Ratoons.

TABLE VI.—**Results of Second Ratoon Variety Trials Reaped at Sophia Sugar Experiment Station and Berbice, and Second and Third Ratoon Variety Trials in East Demerara.**

	Variety.	Cane per Acre, Tons.	Pol. % Cane.	Glucose Ratio.	Purity.	Sucrose in Cane per Acre, Tons.	Sucrose in Cane per Acre, % Mean.	Combined Results for 3 Crops, Plants, 1st and 2nd Ratoons. Variety.	Sucrose in Cane per Acre, Tons.
		Sophia, Field 3 W. Rea			*ped 13. xi.41 at*		*11.25*	*months.*	
MEANS OF 5 PLOTS:	P.O.J. 2878	19.58	14.48	4.99	87.5	2.84	113.60	Co. 213	11.34
	D. 51/33	19.53	12.71	10.61	86.1	2.48	99.20	D. 49/30	9.79
	D. 49/30	17.78	13.26	5.53	90.4	2.36	94.40	P.O.J. 2878	9.77
	Co. 213	22.07	10.56	7.40	83.1	2.33	93.20	D. 51/33	9.75
	Mean:					2.50	100.00		
	Significant Difference, 20: 1:					0.37	14.80		
		Sophia, Field 6 W. Rea			*ped 30. iv.42 at*		*10.50*	*months.*	
MEANS OF 5 PLOTS:	D. 166/34	19.92	16.65	5.02	90.8	3.32	107.10	D. 166/34	10.65
	P.O.J. 2878	18.04	16.05	5.75	90.2	2.89	93.23	P.O.J. 2878	9.61
	Mean:					3.10	100.00		
	Significant Difference, 20: 1:					—	—		
		Sophia, Field 9 W. Rea			*ped 5. xi.41 at*		*11.00*	*months.*	
MEANS OF 5 PLOTS:	P.O.J. 2878	21.07	15.73	4.59	88.1	3.31	107.12	Co. 213	12.77
	Co. 213	23.30	12.33	6.08	84.2	2.87	92.88	P.O.J. 2878	11.03
	Mean:					3.09	100.00		
	Significant Difference, 20: 1:					0.35	11.33		
		Pln. Port Mourant, Field 13 A.				*Reaped*	*4.vi.42*	*at 12.00 months.*	
MEANS OF 5 PLOTS:	Co. 419	47.19	14.66	5.34	85.6	6.92	116.30	Co. 419	20.99
	P.O.J. 2878	38.76	12.85	9.41	82.7	4.98	83.70	P.O.J. 2878	17.71
	Mean:					5.95	100.00		
	Significant Difference, 20: 1:					1.57	26.39		
	Pln. La	*Bonne*	*Intentio*	*n, Field*	*38 L.R.*	*Reaped*	*10.ix.41*	*at 11.75*	*months*
MEANS OF 5 PLOTS:	P.O.J. 2878	33.35	13.80	5.37	88.0	4.60	104.07	P.O.J. 2878	14.73
	D. 51/33	33.51	12.68	9.18	86.5	4.25	96.15	D. 51/33	14.41
	Mean:					4.42	100.00		
	Significant Difference, 20: 1:					—	—		
		Pln.	*Diamon*	*d, Field*	*16 G.*	*Reaped*	*28.viii.*	*41 at 11.50*	*months.*
MEANS OF 5 PLOTS:	D. 419/33	41.76	12.71	9.61	87.6	5.31	119.06	D. 419/33	12.78
	Diamond 10	27.04	13.39	11.61	85.1	3.62	81.17	Diamond 10	9.06
	Mean:					4.46	100.00		
	Significant Difference, 20: 1:					1.26	28.25		
				Third Ratoons.					
	Pln. La	*Bonne I*	*ntention,*	*Field*	*15 F.*	*Reaped*	*25.ix.41*	*at 9.75 months.*	
MEANS OF 5 PLOTS:	D. 166/34	32.74	12.55	19.07	80.2	4.11	119.82	D. 166/34	22.66*
	Diamond 10	28.35	11.55	26.14	78.2	3.27	95.34	Diamond 10	18.76*
	D. 51/33	28.11	10.39	29.80	75.8	2.92	85.13	D. 51/33	18.22*
	Mean:					3.43	100.00		
	Significant Difference, 20: 1:					0.33	9.62		

*Total for 4 Crops, Plants, 1st, 2nd and 3rd Ratoons.

In Field 3 W., Sophia, the standard cane topped the second ratoon returns, Co. 213, which gave the best tonnage of cane, being handicapped by an unusually poor juice. In total yield for three crops Co. 213 retains its usual lead over P.O.J. 2878. D. 51/33 has been discarded.

In Field 6 W., Sophia, which had to be reaped somewhat early, yields were low but cane quality high. D. 166/34 (P.O.J. 2878 x Sorghum) was again first and led the standard by a ton of sucrose per acre over the three crops.

In Field 9 W., Sophia, P.O.J. 2878 was definitely better than Co. 213 as a second ratoon, thanks to a better juice, but in total yield for three crops the Indian cane was superior by 1.74 tons of sucrose per acre.

In Field 13 A., Port Mourant, yields were again high and, as in the two previous harvests, Co. 419 (P.O.J. 2878 x Co. 290) led the standard in no uncertain manner. The column for total yield over three crops shows that the Indian cane has averaged more than a ton of sucrose per acre per harvest above P.O.J. 2878.

In Field 38 L.R., La Bonne Intention, D. 51/33 has not done as well as the standard and has been discarded.

In Field 16 G., Diamond, D. 419/33 (Co. 281 x Diamond 10) gave an excellent second ratoon crop and in total yield for three crops surpassed the favoured cane on the estate by 3.72 tons of sucrose per acre.

In Field 15 F., La Bonne Intention, D. 166/34 (P.O.J. 2878 x Sorghum) gave a high third ratoon yield and led Diamond 10 in no uncertain manner in this crop and in total yield for four harvests.

SUB-SECTION D.—DISCUSSION AND SUMMARY.

In Table VII the mean sucrose yields of all canes in all experiments are compared with that of the standard, P.O.J. 2878, and in Table VIII certain data, indicative of cane quality, are similarly compared.

TABLE VII.—General Mean Sucrose Yields in Tons per Acre from All Experiments.

Variety.	Plants.		First Ratoons.		Second Ratoons.		Total Yield.	Total Yield, P.O.J. 2878 = 100.00
	Yield.	No. of Expts.	Yield.	No. of Expts.	Yield.	No. of Expts.		
	Three	*Crops,*	*Plants,*	*First*	*and Second*	*Ratoons.*		
Co. 419	5.18	9	4.87	5	4.77	1	14.82	123.09
D. 419/33	4.46	8	5.39	5	4.71	3	14.56	120.93
D. [illegible]/34	5.54	10	4.56	6	4.21	3	14.31	118.85
D. [illegible]/33	5.21	8	4.82	2	3.53	1	13.56	112.62
Co. 213	4.46	13	4.23	12	3.64	12	12.33	102.41
P.O.J. 2878	**4.71**	**122**	**3.90**	**75**	**3.43**	**45**	**12.04**	**100.00**
D. 51/33	4.73	4	3.99	4	3.22	3	11.94	99.17
Diamond 10	4.48	46	3.59	39	3.63	30	11.70	97.18
D. 49/30	4.24	16	3.79	14	3.56	11	11.59	96.26
	Two	*Crops,*	*Plants*	*and First*	*Ratoons.*			
D. 200/36	6.56	2	7.60	1	—	—	14.16	164.46
D. 14/34	6.05	9	5.85	3	—	—	11.90	138.21
D. 14/33	6.31	2	5.53	1	—	—	11.84	137.51
D. 174/35	4.54	2	5.95	1	—	—	10.49	121.83
D. 82/35	5.43	4	5.00	1	—	—	10.43	121.14
D. 199/36	4.99	8	4.92	2	—	—	9.91	115.10
D. 116/35	5.09	3	3.83	1	—	—	8.92	103.60
D. 89/35	4.51	2	4.32	1	—	—	8.83	102.56
D. 47/35	5.22	3	3.53	1	—	—	8.75	101.63
D. 139/35	5.04	2	3.69	1	—	—	8.73	101.39
P.O.J. 2878	**4.71**	**122**	**3.90**	**75**	—	—	**8.61**	**100.00**
D. 249/35	4.45	4	3.64	1	—	—	8.09	93.96
D. 194/35	2.35	3	2.42	1	—	—	4.77	55.40
		One	*Crop,*	*Plants*	*only.*			
D. [illegible]/35	7.19	1	—	—	—	—	—	152.65
D. 61/36	6.53	1	—	—	—	—	—	138.64
D. [illegible]/34	6.17	2	—	—	—	—	—	131.00
P. [illegible]/04	6.00	3	—	—	—	—	—	127.39
Co. 421	5.90	10	—	—	—	—	—	125.27
D. 201/36	5.82	1	—	—	—	—	—	123.57
D. [illegible]/35	5.78	1	—	—	—	—	—	122.72
D. [illegible]/35	5.74	3	—	—	—	—	—	121.87
D. [illegible]/36	5.56	3	—	—	—	—	—	118.05
D. [illegible]/35	5.50	2	—	—	—	—	—	116.77
D. [illegible]/36	5.46	2	—	—	—	—	—	115.92
D. [illegible]/35	5.28	2	—	—	—	—	—	112.10
D. [illegible]/35	5.18	1	—	—	—	—	—	109.98
D. [illegible]/35	5.10	1	—	—	—	—	—	108.28
D. [illegible]/35	4.96	3	—	—	—	—	—	105.31
D. 126/35	4.96	1	—	—	—	—	—	105.31
D. 163/35	4.96	1	—	—	—	—	—	105.31
D. 284/35	4.82	1	—	—	—	—	—	102.34
P.O.J. 2878	4.71	122	—	—	—	—	—	100.00
D. [illegible]/35	4.64	4	—	—	—	—	—	98.51
D. [illegible]/36	4.48	2	—	—	—	—	—	95.12
P. [illegible]	4.47	1	—	—	—	—	—	94.90
D. [illegible]/35	4.27	1	—	—	—	—	—	90.66
D. [illegible]	4.26	3	—	—	—	—	—	90.45
D. [illegible]/36	4.26	2	—	—	—	—	—	90.45
D. [illegible]/35	4.17	1	—	—	—	—	—	88.58
D. [illegible]/36	4.16	1	—	—	—	—	—	88.32
D. 220/35	4.01	1	—	—	—	—	—	85.14
D. 54/37	3.96	2	—	—	—	—	—	84.08
D. 2/36	3.96	1	—	—	—	—	—	84.08
D. 493/36	3.78	2	—	—	—	—	—	80.25
D. 48/37	3.66	2	—	—	—	—	—	77.71
D. 51/37	3.58	2	—	—	—	—	—	76.01
D. 37/37	3.48	2	—	—	—	—	—	73.89
D. 46/37	3.29	1	—	—	—	—	—	69.85
D. 77/35	3.06	1	—	—	—	—	—	64.97

TABLE VIII.—**The Quality of the Most Promising Seedlings as Compared with P.O.J. 2878.**

Variety.	Pol % Cane.		Juice Purity.		Glucose Ratio.		Fibre % Cane.	
	% of P.O.J. 2878.	No. of Comparisons.	% of P.O.J. 2878.	No. of Comparisons.	% of P.O.J. 2878.	No. of Comparisons.	% of P.O.J. 2878.	No. of Comparisons.
D. 14/33	111.02	3	104.54	3	65.66	3	140.21	2
D. 419/33	99.05	13	99.46	13	102.55	13	111.66	7
D. 552/33	101.47	11	101.79	11	92.72	11	118.58	6
D. 14/34	109.41	12	103.46	12	77.64	12	110.33	10
D. 166/34	102 27	13	102.36	13	86.65	13	102.65	11
D. 199/36	93.68	10	98.57	10	140.76	10	99.82	9
D. 200/36	102.57	3	100.08	3	94.62	3	122.20	3
Co. 419	98.27	15	99.30	15	99.63	15	90.68	12
Co. 421	100.72	10	101.63	10	81.41	10	130.85	10
P.O.J. 2878	100.00	—	100.00	—	100.00	—	100.00	—

The varieties recommended for commercial extension on the sugar estates are :

D. 14/33, D. 419/33, D. 14/34, D. 166/34, Co. 419 and Co. 421.

D. 14/33 (Co. 281 x Diamond 10) has not yet been sufficiently tested but the few tests reaped and observations in the nurseries and on new experiments indicate that it is a very high yielder of cane of much better quality than the standard. Only a few estates have seed of this variety but it is being distributed as rapidly as possible and a great deal more experimental information will be available before the estate extensions get much further.

D. 419/33 (Co. 281 x Diamond 10) excels as a ratoon, yielding heavy tonnages of cane very slightly inferior to the standard in quality. Its fibre content is superior to that of P.O.J. 2878.

D. 14/34 (Co. 281 x Diamond 10) appears to be an outstanding cane as regards tonnage, ratooning power and quality and deserves special consideration.

D. 166/34 (P.O.J. 2878 x Sorghum) has been well tested and considerable reliance can be placed on its position in the Table. It is a thick cane, popular with labour, which 'covers in' early and is very drought resistant. Its cane averages a slightly better quality than that of P.O.J. 2878 in all respects. It should be extended and closely studied.

Co. 419 (P.O.J. 2878 x Co. 290) is obviously well-suited to the Colony and has attracted much attention on the estates. It is not as resistant to drought as is D. 166/34 and tends to show withered leaf-tips in dry weather. It recovers quickly with the rains, however, and thrives in average to wet conditions. In quality, its cane is not quite up to that of P.O.J. 2878 and its fibre content is definitely lower than that of the standard.

Co. 421 (P.O.J. 2878 x B. 3412) has not been quite as well tested as Co. 419 but seems to be an even better cane for local conditions. If its high fibre causes no difficulties in the factories, it is destined to play an important rôle in local sugar production, for its field characteristics are excellent.

There should be no hesitation about planting ten per cent. of the total cane acreage to these six canes within the next year. Some promise to solve the present juice and fuel problems; among them an ideal cane can probably be found for all local conditions, and their extension will remove the threat which lies in undue reliance on one or two varieties.

It is obvious from Table VII that a number of other canes, which are only partially tested, offer great promise. Among these, D. 200/36 (P.O.J. 2878 x Co. 213), D. 82/35 (D. 13/30 x Diamond 10), D. 134/34 (D. 51/30 x Diamond 10) and B. 34104 (Co. 281 x B.H. 10 12) seem deserving of special mention.

MANURIAL TRIALS.

The results of thirty-six manurial trials, harvested during the period under review, are recorded in six sub-sections, *viz.* :—

A—Nitrogenous manures,

B—Phosphatic manures,

C—Potassic manures,

D—Liming materials,

E—Organic manures,

F—Discussion and summary.

Many of the experiments were of a complex or factorial nature, involving dressings of more than one element. The response to each element is, however, discussed under the appropriate sub-section.

SUB-SECTION A.—NITROGENOUS MANURES.

(A 1) Varying Levels of Sulphate of Ammonia on Flood-Fallowed Frontland.

Field 81 R. H., Rose Hall.

(Plant cane, first, second and fourth ratoon results reported in Sugar Bulls. Nos. 6, p. 57, 7, p. 70, 8, p. 52, and 10, p. 23, respectively.)

Yields were very satisfactory for fifth ratoons and it is clear from Table IX that, with suitable weather, four cwt. of sulphate of ammonia can yield paying increments over two cwt. even with old ratoons. There was, however, no significant increment for six cwt. over four.

Table IX.—Effect of Different Levels of Sulphate of Ammonia on Flood-fallowed Frontland.

Sulphate of Ammonia, Cwt. per Acre.	Mean Yields in Tons Cane per Acre at Rose Hall, Field 81 R.H. P.O.J. 2878, 5th Ratoons.
2	37.03
4	47.01
6	48.31
Sig. Diff., 20 : 1	1.75

(A 2—A 6) Comparisons of Sulphate of Ammonia with Cyanamide on Flood-Fallowed Frontland.

Fields 28 A.E., Port Mourant; 55 T., Rose Hall; 23 K.P., Versailles; 10 Z., Uitvlugt; and 65 Z., De Kinderen.

In none of these five tests (Table X) was any significant difference observed between the effects of equal doses of sulphate of ammonia and cyanamide on cane tonnage, pol % cane, juice purity or glucose ratio.

TABLE X.—**Comparisons of Sulphate of Ammonia with Cyanamide on Flood-fallowed Frontland.**

Treatments per Acre.	Tons Cane / Acre.	Pol % Cane.	Glucose Ratio.	Juice Purity.
Pln. Port	*Mourant,*	*Field 28 A.E.*	*P.O.J. 2878,*	*Plants.*
Sulph. Amm., 2 Cwt.	40.25	14.63	6.82	86.7
Cyanamide, ,, ,,	40.74	15.23	6.08	87.5
	Differences not statistically significant.			
Pln.	*Rose Hall,*	*Field 55 T.*	*P.O.J. 2878,*	*Plants.*
Sulph. Amm., 2 Cwt.	20.85	16.29	4.80	88.3
Cyanamide, ,, ,,	20.49	15.76	4.94	86.9
	Differences not statistically significant.			
Pln.	*Versailles,*	*Field 23 K.P.*	*Diamond 10,*	*Plants.*
No manure	41.88	14.69	9.77	87.2
Sulph. Amm., 5 Cwt.	43.26	14.38	11.91	86.2
Cyanamide, ,, ,,	45.65	15.34	11.56	87.4
	Differences not statistically significant.			
Pln.	*Uitvlugt,*	*Field 10 Z.*	*Diamond 10,*	*Plants.*
Sulph. Amm., 2 Cwt.	36.44	14.04	6.59	88.6
Cyanamide, ,, ,,	33.62	13.93	6.86	88.0
	Differences not statistically significant.			
Pln.	*De Kinderen,*	*Field 65 Z.*	*P.O.J. 2878,*	*Plants.*
Sulph. Amm., 3 Cwt.	53.38	11.14	16.82	81.2
,, ,, 6 ,,	53.92	10.97	18.00	79.3
Cyanamide, 3 ,,	52.29	11.24	16.48	80.7
,, 6 ,,	59.84	10.51	19.64	78.3
	Differences not statistically significant.			

(A 7—A 10) COMPARISONS OF SULPHATE OF AMMONIA WITH CYANAMIDE AND NITRATE OF SODA ON FLOOD-FALLOWED FRONTLAND.

Fields 18 G.W., Providence, Berbice; 2 B.L. and 12 O., Blairmont; 1 L., Bath.

(Plant cane results reported in Sugar Bull. No. 10, pp. 24–25.)

So far as cyanamide is concerned, the results in Table XI confirm those of Table X as to there being no significant difference between the effects of sulphate of ammonia and cyanamide at equal doses. At Fields 18 G.W., Providence, and 12 O., Blairmont, however, nitrate of soda, at an equivalent dose, was definitely inferior to both sulphate of ammonia and cyanamide.

TABLE XI.—**Comparisons of Sulphate of Ammonia with Cyanamide and Nitrate of Soda on Flood-fallowed Frontland.**

Treatments per acre.	Mean Yields in Tons Cane Per Acre from P.O.J. 2878 at			
	Providence, B., Field 18 G.W. 1st Ratoons.	Blairmont, Field 2 B.L. 1st Ratoons.	Blairmont, Field 12 Q. Plants.	Bath, Field 1 L. Plants.
No manure	—	32.79	—	—
Sulph. Amm., 2 Cwt.	—	35.69	22.52	32.92
,, ,, ,, 4 ,,	32.31	39.07	—	—
Cyanamide, 2 ,,	—	37.49	23.21	33.05
,, 4 ,,	31.31	37.40	—	—
N./Soda, 2.64 ,,	—	—	20.05	31.59
,, ,, 5.28 ,,	25.58	—	—	—
Sig. Diff., 20: 1	2.04	3.68	2.13	—

(A 11—A 15) VARYING LEVELS OF SULPHATE OF AMMONIA ON PEGASSY CLAY.

Fields 102 G.D., Diamond; 21 Gv., Wales; 41 E., 93 M.Z., and 43 E., Uitvlugt.

(Plant cane, first and second ratoon results reported in Sugar Bulls. Nos. 8, p. 61, 9, p. 35 and 10, p. 27, respectively.)

It will be seen from Table XII that in Field 102 G.D., Diamond, five cwt. per acre of sulphate of ammonia gave a significantly better yield than three, and that in Field 43 E., Uitvlugt, six cwt. per acre was definitely better than four. In the other three tests the increments of six over four cwt. per acre were not statistically significant. On the other hand, the results reported under A 17, show that a definite increment in favour of five over three cwt. was obtained in Field 68 E., Leonora.

TABLE XII.—**Effect of Different Levels of Sulphate of Ammonia on Pegassy Clay.**

Sulphate of Ammonia, Cwt. per Acre.	Mean Yields in Tons Cane per Acre at				
	Diamond, Field 102 G.D. Diamond 10, Plants.	Wales, Field 21 Gv. P.O J. 2878, 3rd Ratoons.	Uitvlugt, Field 41 E. P.O.J. 2878, Plants.	Uitvlugt, Field 93 M.Z. P.O.J. 2878, Plants.	Uitvlugt, Field 43 E. P.O.J. 2878, 3rd Ratoons.
3	37.53	—	—	—	—
4	39.33	30.97	37.07	25.70	26.51
5	40.46	—	—	—	—
6	—	33.87	38.55	26.57	29.81
8	—	32.52	38.51	26.66	30.66
Sig. Diff., 20: 1	2.29	—	—	—	2.47

(A 16—A 18) COMPARISONS OF SULPHATE OF AMMONIA WITH CYANAMIDE ON PEGASSY CLAY.

Fields 43 Gv. and 68 E., Leonora; and 40 E., Uitvlugt.

(Plant cane results reported in Sugar Bull. No. 10, p. 28.)

Table XIII indicates that, as on flood-fallowed frontland, no differences are to be expected between the yields from equal doses of sulphate of ammonia and cyanamide or between the quality of the cane derived from the two manures. In Field 43 Gv., Leonora, cyanamide depressed juice purity significantly as compared with no manure. The results from Field 68 E., Leonora, confirm the plant cane finding that three cwt. of sulphate of ammonia or cyanamide is too low for optimum yields on this soil.

TABLE XIII.—Comparisons of Sulphate of Ammonia with Cyanamide on Pegassy Clay.

Treatments per Acre.			Tons Cane / Acre.	Pol % Cane.	Glucose Ratio.	Juice Purity.
		Pln.	*Leonora,*	*Field 43 Gv.*	*P.O.J. 2878,*	*Plants.*
No manure			20.25	16.10	6.02	90.6
Sulph. Amm.,	3	Cwt.	21.11	15.90	6.62	89.0
Cyanamide,	,,	,,	20.07	15.68	6.76	87.9
Sig. Diff., 20: 1			—	—	—	1.8
		Pln.	*Leonora,*	*Field 68 E.*	*P.O.J. 2878,*	*1st Ratoons.*
Sulph. Amm.,	3	Cwt.	28.69	16.49	5.81	91.5
,, ,,	5	,,	31.95	16.83	6.06	91.6
Cyanamide,	3	,,	27 97	16.61	5.90	91.1
,,	5	,,	31.37	16.79	5.78	91.7
Sig. Diff., 20: 1			3.14	—	—	—
		Pln.	*Uitvlugt,*	*Field 40 E.*	*P.O.J. 2878,*	*Plants.*
Sulph. Amm.,	5	Cwt.	27.15	14.56	11.97	87.1
Cyanamide,	,,	,,	25.47	14.38	12.31	87.4

Differences not statistically significant.

SUB-SECTION B.—PHOSPHATIC MANURES.

(B 1—B 12) Varying Levels of Phosphatic Manures on Flood-Fallowed Frontland.

Fields B.S.G., Skeldon; 10 P., 31 S., 1 F.F.A., 81 R.H., Rose Hall; 18 G.W., Providence, Berbice; 26 Rp., 12 O., 7 B.L., 23 Rp., Blairmont; 1 L., Bath; and 29 V.B., Wales.

(Plant cane results reported in Sugar Bulls. Nos. 6, p. 82, 8, p. 58, 9, p. 32, 10, pp. 25 and 29, first ratoon in Nos. 7, p. 94, 9, p. 34, 10, p. 26, second ratoon in Nos. 8, p. 69, 10, p. 26, and fourth ratoon in No. 10, p. 29.)

It will be seen from Table XIV that significant responses to phosphates were obtained only at Fields 18 G.W., Providence, Berbice; 26 Rp., Blairmont, and 1 L., Bath. The plant canes in Field 18 G.W., Providence, also showed a response to phosphates and dressings can be advised for this area

TABLE XIV.—Effect of Phosphatic Manuring on Flood-fallowed Frontland.

Treatments in Cwt. Acre.		Lb. P_2O_5 /Acre.	Mean Yields in Tons Cane per Acre from P.O.J. 2878 at											
			Skeldon, Field B.S.G. Plants.	Rose Hall, Field 10 P. 1st Rats.	Rose Hall, Field 31 S. 3rd Rats.	Rose Hall, Field 1 F.F.A. 3rd Rats.	Rose Hall, Field 81 R.H. 5th Rats.	Providence, B. Field 18 G.W. 1st Rats.	Blairmont, Field 26 Rp. Plants.	Blairmont, Filed 12 O. Plants.	Blairmont, Field 7 B.L. 1st Rats.	Blairmont, Field 23 Rp. 2nd Rats.	Bath, Field 1 L. Plants.	Wales, Field 29 V.B. Plants.
No Phosp.		—	43.05	39.65	31.93	22.34	45.21	29.02	30.42	21.81	35.18	36.17	31.59	27.46
Rock Phosp.	1.37	47	—	—	—	—	—	—	—	22.05	—	—	33.45	—
" "	2.75	94	—	—	—	—	—	30.44	—	—	—	—	—	28.79
" "	3	103	41.78	35.33	—	—	—	—	—	—	—	—	—	—
" "	3	103	—	40.80*	—	—	—	—	—	—	—	—	—	28.93
" "	6	206	42.29	37.10	—	—	—	—	—	—	—	—	—	—
" "	6	206	—	39.09*	—	—	—	—	—	—	—	—	—	30.21
" "	9	309	41.16	36.77	—	—	—	—	—	—	—	—	—	—
" "	9	309	—	38.58*	—	—	—	—	—	—	—	—	—	—
Superphosp.	2	36	—	—	—	—	—	—	—	—	37.55*	—	—	—
"	3	54	—	—	—	—	40.96	—	42.94	—	—	—	—	—
"	4	72	—	—	—	—	—	—	—	—	36.82*	—	—	—
"	5.25	94	—	—	33.99	25.16	—	—	—	—	—	—	—	—
"	6	108	—	—	—	—	46.18	—	43.05	—	36.82*	—	—	—
"	8	144	—	—	—	—	—	—	—	—	31.94*	—	—	—
Nicifos	2.34	47	—	—	—	—	—	—	—	21.18	—	—	34.18	—
"	4.68	94	—	—	32.58	23.57	—	31.40	—	—	—	35.61	—	—
Basic Slag	6	101	—	—	—	—	—	—	—	—	—	—	—	30.31
" "	5.61	94	—	—	33.45	23.69	—	—	—	—	—	36.62	—	—
Sig. Diff., 20 : 1			—	—	—	—	—	1.57	2.86	—	—	—	1.75	—

* Residual effect from plant cane applications.

and for Field 26 Rp., Blairmont, which responded very definitely to phosphates, on the same plots in the previous cycle. At 1 L., Bath, also, beneficial effects from phosphatic manuring may be expected.

Although a couple of miles apart, Fields 26 Rp., Blairmont, and 1 L., Bath, are in the same general area and as responses to phosphates have been secured at both sites, there is reason for suspecting that a considerable area in that neighbourhood may respond to phosphates.

(B 13—B 21) Varying Levels of Phosphatic Manures on Pegassy Clay.

Fields 18 U., Cane Grove; 102 G.D., 93 G.D., Diamond; 35 Y.R., 21 G.v., Wales; 43 Gv., Leonora; 41 E., 93 M.Z., 43 E., Uitvlugt.

(Plant cane results reported in Sugar Bulletins Nos. 8, p. 70, 10, p. 33, and first and second ratoon in Nos. 9, p. 41 and 10, p. 31, respectively.)

Table XV indicates that phosphatic manuring can be advised for Fields 18 U., Cane Grove, 102 G.D., Diamond, 35 Y.R., Wales, 43 Gv., Leonora and 43 E., Uitvlugt. The responses at Cane Grove, Wales and Leonora were particularly striking.

At 93 G.D., Diamond, a definite response was obtained in the plants but the increments due to phosphates in the first ratoons were not statistically significant.

At 35 Y.R., Wales, a poor yield, resulting from very unfavourable weather was secured from the plants, but the response to phosphates was statistically significant. The first ratoon yield has been more satisfactory and the response to phosphates even more marked. The plots which were dressed with phosphates in both crops did significantly better than those which were dressed as plants only.

The experiments indicate that ground rock phosphate is as efficient as basic slag.

There is some suggestion that 6—9 cwt. is the maximum dose required, but this point should come out more clearly as the experiments get older in the cycle.

Field 43 E., Uitvlugt, has now given a beneficial response to direct dressings to three crops and, in the fourth harvest, to the residual effects of these three dressings.

TABLE XV.—Effect of Phosphatic Manuring on Pegassy Clay.

Treatments in Cwt./Acre.	Lb. P_2O_5 /Acre.	Mean Yields in Tons Cane per Acre at								
		Cane Grove, Field 18 U. P.O.J. 2878, Plants.	Diamond, Field 102 G.D. Diamond 10, Plants.	Diamond, Field 93 G.D. Diamond 10, 1st Ratoons.	Wales, Field 35 Y.R. P.O.J. 2878, 1st Ratoons.	Wales, Field 21 Gv. P.O.J. 2878, 3rd Ratoons.	Leonora, Field 43 Gv. P.O.J. 2878, Plants.	Uitvlugt, Field 41 E. P.O.J. 2878, Plants.	Uitvlugt, Field 93 M.Z. P.O.J 2878, Plants.	Uitvlugt, Field 43 E. P.O.J. 2878, 3rd Ratoons.
No Phosphate	—	18.98	38.20	28.77	23.56	31.87	21.11	37.19	25.16	26.67
Rock ,, 3	103	—	—	—	27.99*	—	—	—	—	—
,, ,, 3	103	26.71	—	—	30.68	—	—	—	—	—
,, ,, 6	206	—	—	—	30.33*	—	—	—	—	—
,, ,, 6	206	30.30	—	—	33.20	—	—	38.72	26.58	—
,, ,, 9	309	—	—	—	29.58*	—	—	—	—	—
,, ,, 9	309	31.96	—	—	31.95	—	—	—	—	—
,, ,, 10	343	—	—	—	—	—	30.24	—	—	—
,, ,, 20	687	—	—	—	—	—	29.08	—	—	—
Basic Slag 3	50	—	—	29.96	—	—	—	—	—	—
,, ,, 5	84	—	38.50	—	—	33.74	—	—	—	30.07†
,, ,, 6	101	—	—	—	28.05*	—	—	—	—	—
,, ,, 6	101	—	—	30.12	35.50	—	—	38.22	27.20	—
,, ,, 10	168	—	40.62	—	—	31.75	—	—	—	30.24†
Sig. Diff., 20: 1		2.53	2.29	—	5.24	—	5.46	—	—	2.47

* Residual effect from plant cane applications.

† ,, ,, ,, applications to the three previous crops.

SUB-SECTION C.—POTASSIC MANURES.

(C 1—C 2) Varying Levels of Sulphate of Potash on Flood-Fallowed Frontland.

Fields 81 R.H., Rose Hall; and 26 Rp., Blairmont.

(Plant cane, first, second and fourth ratoon results reported in Sugar Bulls. No. 6, p. 87, No. 7, p. 100, No. 8, p. 74 and No. 10, p. 34, respectively.)

Table XVI and the results of previous harvests indicate that potassic manuring cannot be advised for either of these sites.

Table XVI.—**Effect of Different Levels of Sulphate of Potash on Flood-fallowed Frontland.**

Sulphate of Potash. Cwt. per Acre.	Mean Yields in Tons Cane per Acre from P.O.J. 2878 at	
	Rose Hall, Field 81 R.H. 5th Ratoons.	Blairmont, Field 26 Rp. Plants.
0	43.87	41.29
2	43.69	41.48
4	44.80	42.64
	Differences not statistically significant.	

(C 3—C 11) Sulphate and Muriate of Potash on Pegassy Clay.

Fields 102 G.D., 93 G.D., Diamond; 21 Gv., Wales; 43 Gv., 68 E., Leonora; 41 E., 93 M.Z., 43 E., Uitvlugt; 71 D.K., De Kinderen.

(Plant cane results reported in Sugar Bulls. Nos. 8, p. 76 and 10, pp. 28 and 35, first and second ratoon in Nos. 9, p. 44 and 10, p. 34, respectively.)

Table XVII shows that definite responses were obtained from potassic manuring at Fields 102 and 93 G.D., Diamond and Fields 41 E. and 93 M.Z., Uitvlugt, that of the last-mentioned being particularly striking. Field 43 E., Uitvlugt, had responded definitely to potash in the three previous crops but the slight increment in the 3rd ratoons was not statistically significant. Apart from these five fields, potassic manuring cannot be advised for the other sites. The experiments do not disclose any significant difference in the effects of equivalent amounts of sulphate or muriate of potash.

TABLE XVII.—Effect of Sulphate and Muriate of Potash on Pegassy Clay.

Potash Treatments.	Lb. K_2O per Acre.	Mean Yields in Tons Cane per Acre at								
		Diamond, Field 102 G.D. Diamond 10, Plants.	Diamond, Field 93 G.D. Diamond 10, 1st Ratoons.	Wales, Field 21 Gv. P.O.J. 2878, 3rd Ratoons.	Leonora, Field 13 Gv. P.O.J. 2878, Plants.	Leonora, Field 68 E. P.O.J. 2878, 1st Ratoons.	Uitvlugt, Field 41 E. P.O.J. 2878, Plants.	Uitvlugt, Field 93 M.Z. P.O.J. 2878, Plants.	Uitvlugt, Field 13 E. P.O.J. 2878, 3rd Ratoons.	De Kanderen, Field 71 D.K. P.O.J. 2878, Plants.
No Potash	—	37.79	27.23	33.63	21.11	29.73	36.06	22.77	28.03	22.75
Sulphate	110	39.26	23.77	33.32	—	29.80	38.34	28.19	29.03	24.43
"	220	40.26	31.86	—	—	—	—	—	—	—
Muriate	110	—	—	30.40		30.46	34.73	27.98	29.87	21.19
"	165	—	—	—	20.29	—	—	—	—	—
Sig. Diff., 20 : 1		2.29	2.03	—	—	—	3.00	3.04	—	—

SUB-SECTION D.—LIMING MATERIALS.

(D 1—D 5) Varying Levels of Liming Materials on Flood-Fallowed Frontland.

Fields 31 K., Albion; 26 Rp., 7 B.L., 71 B.L., Blairmont; 16 E.P., Enmore.
(Plant cane results reported in Sugar Bulls. Nos. 9, p. 48 and 10, pp. 36 and 37 and first ratoon in No. 10, p. 36.)

From Table XVIII it will be seen that only at one site, Field 26 Rp., Blairmont, was any definite response to liming materials observed from dressings applied to plant canes only.

TABLE XVIII.—**Effect of Liming Materials on Flood-fallowed Frontland.**

Treatments in Tons/Acre.	Mean Yields in Tons Cane per Acre from P.O.J. 2878 at				
	Albion, Field 31 K. 2nd Ratoons.	Blairmont, Field 26 Rp. Plants.	Blairmont, Field 7 B.L. 1st Ratoons.	Blairmont, Field 71 B.L. 1st Ratoons.	Enmore, Field 16 E.P. Plants.
No Liming Materials	32.02	40.10	37.82	35.42	35.32
Lime, 0.5 Tons	31.58	—	—	36.46	33.68
,, 1.0 ,,	29.60	—	—	35.85	35.60
Ground Limestone 0.5 ,,	30.90	—	—	37.94	35.35
,, ,, 1.0 ,,	30.56	43.17	—	35.98	35.87
,, ,, 2.0 ,,	—	42.14	36.78	—	—
,, ,, 4.0 ,,	—	—	35.20	—	—
,, ,, 6.0 ,,	—	—	34.67	—	—
,, ,, 8.0 ,,	—	—	38.42	—	—
Sig. Diff., 20: 1	—	2.47	—	—	—

(D 6—D 8) Varying Levels of Ground Limestone on Pegassy Clay.

Fields 102 G.D., 93 G.D., Diamond; 43 Gv., Leonora.
(Plant cane results reported in Sugar Bull. No. 10, p. 37.)

Dressings to plants only have failed to yield any significant effect (Table XIX) on tonnage or cane quality.

TABLE XIX.—**Effect of Ground Limestone on Pegassy Clay.**

Tons per Acre of Ground Limestone.	Mean Yields in Tons Cane/Acre at					
	Diamond, Field 102 G.D. Diamond 10, Plants.	Diamond, Field 93 G.D. Diamond 10, 1st Ratoons.	Leonora, Field 43 Gv. P.O.J. 2878, Plants.			
			Tons Cane per Acre.	Pol % Cane.	Juice Purity.	Glucose Ratio
0	38.42	30.19	24.06	15.63	88.8	6.40
1	—	29.99	—	—	—	—
2	39.75	28.67	24.63	15.56	88.8	7.11
4	39.15	—	26.91	15.74	89.3	5.90
	Differences not statistically significant.					

SUB-SECTION E.—ORGANIC MANURES.

Little if any systematic use has been made of pen manure and filterpress cake in British Guiana cane fields in the past, and, indeed, the burning of filterpress cake is not uncommon. With a view to determining the optimum doses for these two products and stimulating their proper use, however, a number of experiments were started after the outbreak of war, and the information so far obtained is presented in this sub-section.

(E 1—E 6) Pen Manure and Filterpress Cake on Flood-Fallowed Frontland.

Fields 28 A., Port Mourant; 55 T., Rose Hall; 26 Bk., Blairmont; 23 Kp., Versailles; 10 Z., Uitvlugt; and 65 Z., De Kinderen.

The results of these tests appear in Table XX, where it will be seen that :

(a) Doses of 12-15 Tons/acre of pen manure or filterpress cake may be expected to give the same plant cane yield as the normal applications of ammonium sulphate;

(b) Burnt filterpress cake is no more efficient, ton per ton, than the unburnt (*i.e.* the year's production will treat a much larger area if used unburnt) ;

(c) There is no significant difference between the quality of the cane produced by the organic manures and that produced by ammonium sulphate. In one instance, on a soil of high natural fertility, both ammonium sulphate and pen manure tended to lower the quality of the cane more than did filterpress cake.

TABLE XX.—**Effect of Pen Manure and Filterpress Cake on Plant Canes on Flood-fallowed Frontland.**

Treatments per Acre.		Cane per Acre, Tons.	Pol % Cane.	Glucose Ratio.	Juice Purity.
		Field 28 A.,	*Port Mourant,*	*P.O.J. 2878.*	
S. Amm.,	2 Cwt.	40.25	14.63	6.82	86.7
Press Cake,	5 Tons	36.21	14.83	5.51	87.1
Pen Manure,	10 „	38.46	14.95	6.45	87.6
		Differences not statistically significant.			
		Field 55 T.,	*Rose Hall,*	*P.O.J. 2878.*	
S. Amm.,	2 Cwt.	20.85	16.29	4.80	88.3
Press Cake,	5 Tons	20.03	16.04	4.90	86.7
Pen Manure,	10 „	20.34	16.24	4.74	87.5
		Differences not statistically significant.			

TABLE XX (Contd.).—**Effect of Pen Manure and Filterpress Cake on Plant Canes on Flood-fallowed Frontland.**

Treatments per Acre.	Cane per Acre, Tons.	Pol % Cane.	Glucose Ratio.	Juice Purity.
	Field 26 Bk.,	*Blairmont,*	*P.O.J. 2878.*	
No manure	18.77			
S. Amm., 2 Cwt.	25.89			
Press Cake, 6.5 Tons	21.90			
,, ,, ,, 13.0 ,,	25.45			
Burnt Press Cake, 6.1 ,,	21.73			
Sig. Diff., 20:1	2.93			
	Field 23 Kp.,	*Versailles,*	*Diamond 10.*	
No manure	41.88	14.69	9.77	87.2
S. Amm., 5 Cwt.	43.26	14.38	11.91	86.2
Press Cake, 11.75 Tons	44.64	14.38	9.85	86.8
Pen Manure, 15.75 ,,	45.12	13.96	13.66	84.3
Sig. Diff., 20:1	—	—	3.43	3.2
	Field 10 Z.,	*Uitvlugt,*	*Diamond 10.*	
S. Amm., 2 Cwt.	36.44	14.04	6.59	38.6
Press Cake, 6 Tons	36.56	14.26	6.97	87.5
Pen Manure, 10 ,,	34.66	13.93	7.55	86.7
	Differences not statistically significant.			
	Field 65 Z.,	*De Kinderen,*	*P.O.J. 2878.*	
S. Amm., 3 Cwt.	53.38	11.14	16.82	81.2
,, ,, ,, 6 ,,	53.92	10.97	18.00	79.3
Press Cake, 6 Tons	47.38	10.19	20.35	78.0
Pen Manure, 10 ,,	54.84	11.32	14.89	81.0
	Differences not statistically significant.			

(E 7—E 9) PEN MANURE AND FILTERPRESS CAKE ON PEGASSY CLAY.

Fields 5 H., Cane Grove; 43 Gv., Leonora; and 40 E., Uitvlugt.

Table XXI presents the results from these tests, and the main conclusion must be similar to that arrived at for the experiments on frontland just described.

The test at Cane Grove was laid down by the Estate Authorities who kindly allowed the Station to weigh the plots.

The soil of Field 43 Gv., Leonora, is very deficient in phosphate and the results reported under A 16 and B 18, indicate that the large increment registered by pen manure over ammonium sulphate alone should be attributed to the phosphate content of the pen manure. The ratoons growing in this field are showing a very marked residual response to the original pen manure dressing.

In Field 40 E., Uitvlugt, the original applications were 6 Tons/acre filterpress cake and 10 Tons/acre pen manure. There were, however, signs that

heavier doses were needed, and additional dressings were given, when the cane was five months old, to bring the totals to 12 and 15 Tons/acre, respectively. It is probably this late application which brought about the adverse effect of filterpress cake on cane quality.

TABLE XXI.—**Effect of Pen Manure and Filterpress Cake on Plant Canes of P.O.J. 2878 on Pegassy Clay.**

Treatments per Acre.		Cane per Acre, Tons.	Pol % Cane.	Glucose Ratio.	Juice Purity.
		Field 5 H., Cane Grove.			
S. Amm.,	2 Cwt.	53.24	13.38	10.79	86.0
Press Cake,	5 Tons	51.03	15.27	6.57	89.9
„ „ „	10 „	56.18	14.61	8.51	88.7
„ „ „	20 „	54.60	14.38	8.03	87.8
„ „ „	30 „	61.70	14.03	8.67	87.3
Pen Manure,	5 „	43.22	14.53	10.39	89.5
„ „ „	10 „	47.16	12.27	13.71	84.3
„ „ „	20 „	55.71	13.03	10.45	86.5
„ „ „	30 „	57.04	14.38	10.41	85.4
*Mixture,	5 „	50.36	14.08	9.04	86.2
„ „	10 „	52.77	13.81	8.34	88.5
„ „	20 „	51.40	13.39	8.92	87.2
„ „	30 „	61.87	13.74	9.80	87.3
Differences not statistically significant.					
		Field 43 Gv., Leonora.			
No Manure		20.25	16.10	6.02	90.6
S. Amm.,	3 Cwt.	21.74	15.75	6.51	88.9
Pen Manure,	12 Tons	28.66	15.54	6.43	89.0
Sig. Diff., 20: 1		3.14	0.46	—	1.0
		Field 40 E., Uitvlugt.			
S. Amm.,	5 Cwt.	27.15	14.56	11.97	87.1
Press Cake,	12 Tons	24.89	12.99	15.81	82.6
Pen Manure,	15 „	26.75	14.71	11.67	88.9
Sig. Diff., 20: 1		—	0.93	2.74	3.0

*Equal parts of pen manure and filterpress cake.

SUB-SECTION F.—DISCUSSION AND SUMMARY.

The Rate of Application of Sulphate of Ammonia.

The results of a fifth ratoon crop at Rose Hall, where four cwt. per acre averaged ten tons of cane per acre more than two, confirm previous recommendations that ratoons on flood-fallowed frontland should be given four cwt. of ammonium sulphate per acre.

On pegassy clay, trials at three sites indicated 5—6 cwt. per acre as the optimum dose but at three other sites the increments in favour of the heavier dressings were not large enough to be statistically significant under the prevailing conditions. The average increment recorded for six cwt. per acre

over four, from 29 harvests at 13 different sites, is 2.24 tons of cane per acre. In two harvests at two sites, five cwt. per acre have averaged 3.09 tons of cane per acre more than three. Six cwt. per acre would not prove economic at present fertilizer prices but in normal times five cwt. might be used with advantage.

Substitutes for Sulphate of Ammonia.

Data from twelve experiments support the findings of three reported in *Sugar Bulletin* No. 10, to the effect that equal doses of ammonium sulphate and of cyanamide produce similar crops of cane. The results were the same whether flood-fallowed frontland or pegassy clay was the growing medium. Juice tests carried out on the cane from eight of the trials here reported also indicate that the two fertilizers have no significant differential effect on cane quality.

In two tests out of three reported in this paper, nitrate of soda yielded definitely less cane than did an equivalent amount of ammonium sulphate. In a number of earlier tests, however, yields were substantially the same from the two manures. This comparison is being thoroughly investigated, with the co-operation of the Chilean Nitrate Interests, and considerably more information will be available for the next Bulletin of this series.

Phosphates.

As in previous Bulletins, few definite responses to phosphatic manuring are reported from flood-fallowed frontland. Dressings can, however, be advised for Field 18 G.W., Providence, Berbice, and the responses in the Rampoor section at Blairmont and the not too distant Locarno section at Bath suggest that there may be a considerable area in this vicinity which may answer to phosphatic manuring. It would not be difficult for the estate authorities to test this by a number of scattered plots in which 15 tons per acre of filterpress cake or of pen manure are compared with the standard dressing of ammonium sulphate. A heavier crop from the organic manure would strongly suggest a response to phosphate (see *Organic Manures* below).

On the pegassy clay, phosphates had a definite beneficial effect in five out of the nine trials reported, while one of the other sites had definitely responded in the plant canes. Unfortunately, there does not seem to be any simple relationship between the field response to phosphatic manuring and the phosphate content of the soil, as determined chemically, and, until further laboratory research is devoted to this aspect, the responding areas can only be determined by field tests. The position in this respect, to date, is summarised in Table XXII.

The responses noted as slightly beneficial are small enough to be within the limits of chance fluctuations and, in any case, few if any of them would prove economic.

On many pegassy clay areas, however, lack of phosphates is definitely a limiting factor in crop production and profitable returns may be expected from their use, especially on certain parts of Cane Grove, Wales, Leonora and Uitvlugt.

So far, rock phosphate, basic slag and Nicifos appear to be equally efficient as sources of phosphate.

TABLE XXII.—**Summary of Results from Manurial Trials with Phosphates.**

Field.	Estate.	Truog Available Phosphate. p.p.m.		Effect of Phosphate on Cane Yield.
		Topsoil.	Subsoil.	
		Frontland		
B.S.G.	Skeldon	<10	Trace	Slightly adverse
13 R.	Port Mourant	18	21	Very slightly beneficial
20 R.	" "	18	32	" "
23 R.	" "	Trace	10	Slightly beneficial
35 A.	" "	10	<10	Slightly adverse
23 B.	Albion	Nil	Nil	Slightly beneficial
81 R.H.	Rose Hall	30	56	" "
19 L. 20	" "	14	60	" "
31 S.	" "	Nil	75	" "
1 F.F.A.	" "	Nil	35	" "
20 T.	" "	18	20	Very slightly beneficial
10 P.	" "	26	100	Slightly adverse
18 G.W.	Providence, B.	15	15	Definitely beneficial
12 O.	Blairmont	17	11	Very slightly adverse
15 H.P.	"	35	19	Slightly adverse
7 B.L.	"	26	—	Very slightly beneficial
23 Rp.	"	<10	10	Slightly beneficial
26 Rp.	"	82	84	Definitely beneficial
2 Ab.	"	Nil	Nil	No effect
1 L	Bath	13	<10	Definitely beneficial
24 V.B.	Wales	15	15	Slightly beneficial
15 F.	L.B.I.	32	24	Slightly adverse
34 V.S.	Versailles	18	18	Slightly beneficial
35 C.I.	Leonora	38	24	" "
14 E.	Uitvlugt	—	—	Slightly adverse
12 W.	Sophia	20	20	" "
5, 7, 8 W.	"	35	49	No effect "
		Pegassy Clay		
36 S.D.	Cane Grove	Trace	Trace	Definitely beneficial
18 U.	" "	13	<10	" "
51 M.	" "	10	10	" "
53 M.	" "	10	10	" "
4 P.	" "	50	27	Very slightly beneficial
93 G.D.	Diamond	296	104	Definitely beneficial in one crop, slightly in next
102 G.D.	"	166	72	Definitely beneficial
10 C.	Wales	30	18	" "
35 Y.R.	"	15	11	" "
21 Gv.	"	196	74	Slightly beneficial
43 Gv.	Leonora	10	<10	Definitely beneficial
65 F.	"	19	14	Beneficial
31 E.	Uitvlugt	43	11	Slightly beneficial
41 E.	"	60	25	" "
43 E.	"	63	20	Definitely beneficial
93 M.Z.	"	20	14	Slightly beneficial
64 Z.	"	>200	53	No effect
69 Z.	"	200	70	Very slightly adverse
70 Z.	"	120	54	Slightly beneficial

Potash.

Trials at six sites (two at Port Mourant, and one each at Rose Hall, Blairmont, Sophia and Uitvlugt), reported in this and previous Bulletins of the series, have given no indication that potassic manuring will be profitable on frontland soils.

On pegassy clay to date, definite responses have been secured at seven out of thirteen sites. The response to potash at Field 93 M.Z., Uitvlugt, was very striking.

The experiments indicate that there is nothing to choose between the sulphate and the muriate as a source of potash.

Liming Materials.

On flood-fallowed frontland, a definite response to limestone was obtained at Field 26 Rp., Blairmont, but at four other sites on this soil type and three on pegassy clay, reported in this Bulletin, the dressings had no significant effect.

Organic Manures.

Water transport and topographical conditions have the double effect, in this Colony, of making the maintenance of a large herd of draft animals unnecessary and of creating more difficulties than usual in the making, transport and application of bulky organic manures.

Nevertheless, it is indeed surprising to see what little effort has been made to use what pen manure and filterpress cake there is to the best advantage, and there can be no satisfactory excuse for the not uncommon practice of burning the latter in a Colony where pre-harvest burning destroys much of the crop residue and where most of the soils are heavy, low-lying, water-logged clays, poor in organic matter.

A number of experiments recorded in this paper leave no doubt as to a dose of fifteen tons of pen manure or of filterpress cake being a satisfactory substitute for the normal ammonium sulphate application given to plants. There is also strong evidence that where phosphate is a limiting factor the cane can get its supply from pen manure. These findings are of considerable importance at the present juncture when phosphates are unobtainable and nitrogenous manures scarce and costly, and an awakening of interest in organic manures on certain estates is a welcome sign.

An attempt is being made to measure the probable residual effect of the plant cane dressing on the ratoon crops. If the indications of this effect are confirmed, the case for the use of organic manures will be further strengthened.

It is not suggested that animals should be kept for the specific purpose of making manure, but that, on the other hand, the goal should be that *all* the excrement from *every* animal on the estates, whether estate or privately owned, and all the filterpress cake, be used to break down the maximum possible quantity of organic matter (rice straw, grass, bush, bagasse, legumes, etc.) and that every acre of plant canes be given fifteen tons of organic manure per acre.

APPENDIX I.

SOILS OF MANURIAL TRIAL SITES.*

Plantation :—	SKELDON		PORT MOURANT		ROSE HALL				PLAIRMONT				BATH		CANE GROVE		DIAMOND	
Field No. :—	B.S.G.		28 A.E.		10 P.		55 T.		12 O.		26 B.K.		1 L.		18 U.		102 G.D.	
Sample No. :-	B. 738	B. 739	B. 748	B. 749	B. 734	B. 735	B. 746	B. 747	B. 744	B. 745	B. 757	B. 758	B. 740	B. 741	D. 1937	D. 1938	D 1998	D. 1999
Sampling Depth :--	0—1 ft.	1—2 ft.	0—1 ft.	1—2 ft.	0—1 ft.	1—2 ft.	0—1 ft.	1—2 ft.	0—1 ft.	1—2 ft.	0—1 ft.	1—2 ft.	0—1 ft.	1—2 ft.	0- 1 ft.	1 -2 ft.	0—1 ft.	1—2 ft.
Normal pH	4.83	4.64	6.80	7.12	6.21	6.94	6.54	7.08	5.27	5.43	5.48	6.54	5.13	5 57	4.56	4.49	4.58	4.68
Exchange pH	3.86	3.79	5.51	5.95	5.11	5.86	5.55	6.17	3.94	3.95	4.77	5.71	3.94	4.26	3.63	3.63	3.66	3.70
% Soluble Salts	.083	.133	.065	.113	.052	.140	.144	.231	.023	.033	.256	.314	.035	.067	.025	.037	.019	.016
% Organic Matter	2.46	2.10	2.12	1.18	2.60	1.66	2.75	1.45	3.84	2.23	2.24	1.02	4.96	2.20	4.10	5.33	5.49	3.30
Avail. P_2O_5 p.p.m. (Truog)	<10	Trace	<10	35	26	100	37	137	17	11	22	21	13	<10	13	<10	166	72
Exch. and Water Sol. Bases mg. eqs./100 gms. Ca O	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	2.90	3.10
Mg O	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	2.58	3.70
K_2O	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	0.71	0.43

Plantation :—	WALES		VERSAILLES		LEONORA		UITVLUGT								DE KINDEREN			
Field No. :—	29 V.B.		23 K.P.		43 Gv.		40 E.		41 E.		10 Z.		93 M.Z.		65 Z.		71 D.K.	
Sample No. :-	D. 1929	D. 1930	D. 1996	D. 1997	D. 1994	D. 1995	D. 1947	D. 1948	D. 1935	D. 1936	D. 1949	D. 1950	D. 1953	D. 1954	D. 1945	D. 1946	D. 1943	D. 1944
Sampling Depth :—	0—1 ft.	1- 2 ft.	0—1 ft.	1—2 ft.	0—1 ft.	1—2 ft.	0—1 ft.	1—2 ft.	0—1 ft.	1—2 ft.	0—1 ft.	1—2 ft.	0—1 ft.	1—2 ft.	0—1 ft.	1—2 ft.	0—1 ft.	1—2 ft.
Normal pH	4.56	4.85	4.80	4.83	4.23	3.97	4.91	4.83	4.65	4.48	5.60	7.02	4.58	4.44	4.89	5.25	3.94	3.58
Exchange pH	3.62	3.70	3.65	3.77	3.69	3.49	3.87	3.78	3.78	3.78	4.88	5.99	3.83	3.68	3.63	3.87	3.43	3.56
% Soluble Salts	.093	.097	.021	.054	.036	.043	.015	.014	.021	.020	.158	.137	.031	.022	.021	.018	.072	.133
% Organic Matter	2.00	1.29	1.68	1.25	10.84	11.00	3.72	1.80	10.46	6.42	1.12	.924	7.95	3.65	2.75	1.56	27.30	16.33
Avail. P_2O_5 p.p.m. (Truog)	15	15	12	11	10	<10	25	13	60	25	20	23	20	14	35	18	22	<10
Exch. and Water Sol. Bases mg. eqs./100 gms. Ca O	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Mg O	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
K_2O	—	—	—	—	0.57	—	—	—	0.27	—	—	—	0.39	—	—	—	0.36	—

*The data for sites mentioned in this Bulletin and not printed here will be found in the Bulletin presenting the first plant cane results from such sites.

THE QUALITY OF BRITISH GUIANA CANE.

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Introduction.

It is generally accepted that the quality of the cane delivered to the British Guiana mills compares unfavourably with that of the neighbouring colonies of Antigua, St. Kitts, Barbados and, to a lesser extent, Trinidad. Much of the difference is perhaps attributable to the heavier tonnages secured in British Guiana, the shallowness of the fertile and well-drained soil layer under British Guiana conditions of heavy flat clay lands, below sea-level and subject to 80—100 in. of rain per annum, the presence of high concentrations of salts in the soil, and the difficulty of finding a rich variety which will thrive under local conditions.

On the other hand, the pol of cane of samples, from experimental plots throughout the sugar belt, milled and analysed at the Sugar Experiment Station, has for years been consistently higher than the figures reported by the factories, and, at the request of the Sugar Experiment Stations' Committee, a number of *ad hoc* investigations have been made from time to time as other work permitted.

While the subject has not been exhaustively explored, it is felt that publication of the results so far obtained will be of interest to Planters and may be of some assistance in enhancing the improvement in cane quality which the the new high-yielding varieties promise.

Experiment I.—Composition of the Puntload.

Visits were made to the milldocks at four Demerara and one Berbice estate and punts, selected at random from those about to be crushed, were emptied of their contents cane by cane. All trash, 'cane bands', immature canes (water shoots) and rotten cane were separated out and any cane which had been imperfectly topped or showed immature joints still remaining was properly topped and the piece removed placed with the trash, etc. Then the various components were separately weighed and it was thus possible to estimate the percentage of sound millable cane and the percentage of immature cane, trash, etc., which reach the mills. Representative samples of the cleaned cane and of the rejected immature canes and top joints from each punt were analysed at the Sugar Experiment Station and Table I summarises the findings.

TABLE I.

The Composition of the Puntloads of Cane Reaching the B.G. Mills.

Estate	No. of Punts Examined	Mature, Sound Cane.			Immature Cane, Trash, Tops, &c.		
		%	Pol % Cane	Juice Purity	%	Pol % Cane	Juice Purity
A	3	90.7	15.98	89.3	9.3	9.14	65.1
B	6	91.6	13.75	85.5	8.4	9.48	69.1
C	6	85.0	12.89	80.0	15.0	9.08	67.7
D	14	79.0	10.71	80.6	21.0	4.79	47.9
E	4	78.4	13.02	81.8	21.6	—	—

The proportion of immature cane was unusually high at D and E as a result of P.O.J. 2878 putting on a particularly heavy second growth when the midyear rains of 1940 came on after a severe drought. On the other hand, the punts at A and B appeared definitely 'cleaner' than the average.

Considering the above figures and relating the general appearance of the cane in mill docks to that in the punts examined, it would probably be conservative to say that at least 10% of the Colony's punt contents consists of very undesirable material.

While complete elimination of this material is hardly possible, it could be much reduced by :

1. Taking off a couple of joints with the crown of leaves even when the tops are not required for planting;
2. Instructing canecutters not to put water shoots (suckers) in the loading heaps;
3. Having the puntloading gangs leave the 'cane bands' on the dambeds.

EXPERIMENTS 2 AND 3.—EFFECT OF IMMERSING CUT CANE IN WATER.

It was suggested by a Member of one of the Estates' staffs that the soaking of cane in water in the bottom portion of the punts might adversely affect cane quality.

Two experiments were therefore conducted in each of which parallel samples of unburnt cane were held (a) exposed to the sun on the dam and (b) sunk in the navigation canal, and a sample from each group crushed and analysed every 24 hours over a period of four days.

The mean results of the two experiments appear in Table II, and the straight regression lines calculated from the observations are plotted in Figure I.

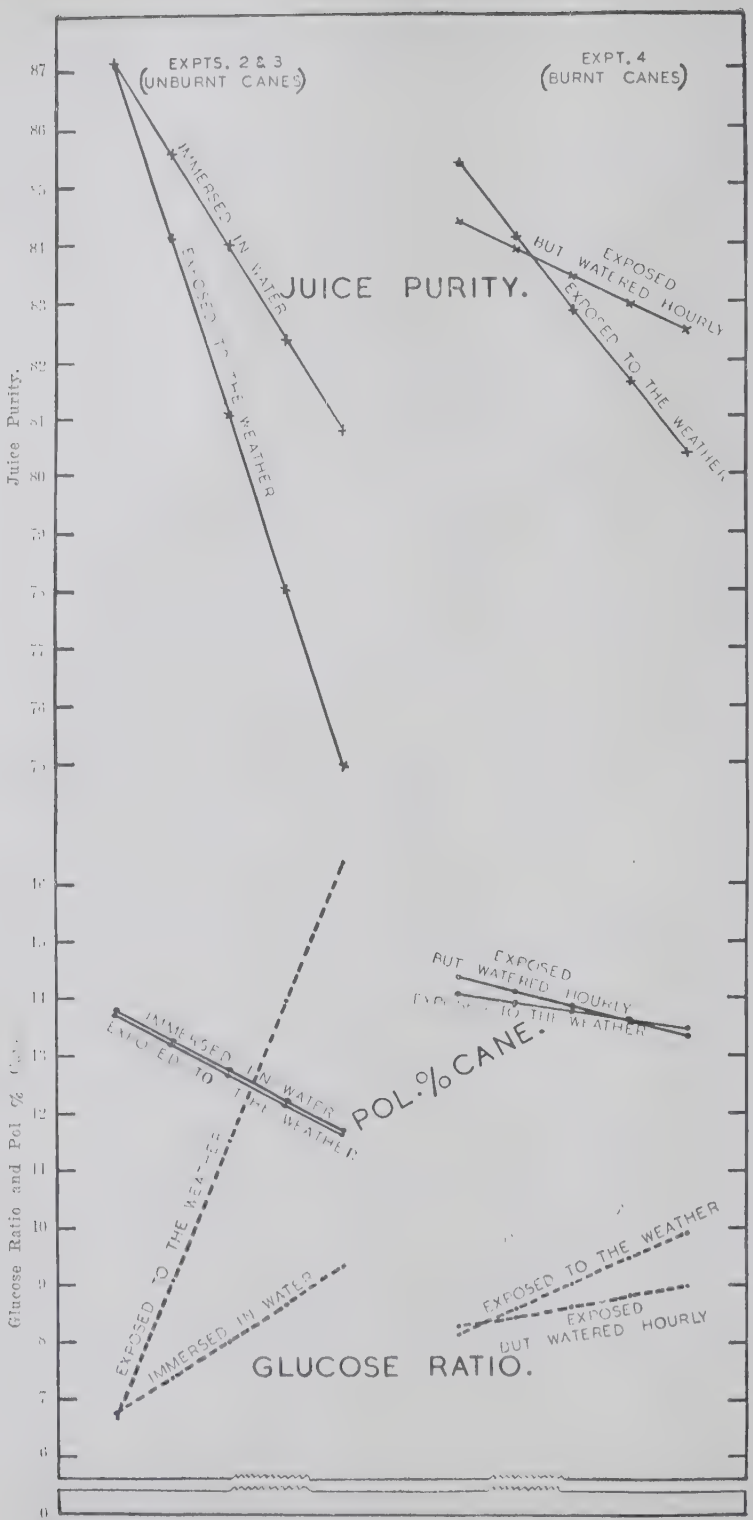
EXPTS. 2 & 3
(UNBURNT CANES)
EXPT. 4
(BURNT CANES)
IMMERSED IN WATER
EXPOSED TO THE WEATHER
JUICE PURITY.
BUT EXPOSED WATERED HOURLY
EXPOSED TO THE WEATHER
Juice Purity.
IMMERSED IN WATER
EXPOSED TO THE WEATHER
POL.% CANE.
BUT EXPOSED WATERED HOURLY
EXPOSED TO THE WEATHER
IMMERSED IN WATER
EXPOSED TO THE WEATHER
EXPOSED
BUT WATERED HOURLY
GLUCOSE RATIO.
Glucose Ratio and Pol % Cane.

TABLE II.

Comparison of the Effects of Exposure to the Sun and Soaking in Water on the Quality of Cut Cane.

Days after Harvest	Exposed on Ground			Immersed in Canal		
	Pol % Cane	Juice Purity	Glucose Ratio	Pol % Cane	Juice Purity	Glucose Ratio
0	13.84	87.3	6.87	—	—	—
1	13.40	84.4	7.86	13.47	85.5	7.21
2	12.04	80.1	12.90	12.20	83.7	7.78
3	12.47	78.8	14.12	12.43	82.7	9.21
4	11.70	74.8	15.86	11.69	80.7	9.12

It is obvious that while the loss of sucrose in both lots was approximately identical, the adverse effect of delayed milling on juice purity and glucose ratio was much more marked in the lot exposed to the sun than in the lot immersed in water.

EXPERIMENT 4.—EFFECT OF WATERING CUT CANE

Parallel samples of burnt cane were crushed and analysed at 24-hour intervals up to four days after harvest, one group of samples being simply exposed on the ground while the other was sprayed with water every hour from 7 a.m. through 4 p.m. The results are shown in Table III, and the regression lines in Figure I.

TABLE III.

Comparison of the Effects of Simple Exposure as Compared with Hourly Spraying with Water on the Quality of Cut Cane.

Days after Harvest	Exposed on Ground			Exposed and Sprayed Hourly		
	Pol % Cane	Juice Purity	Glucose Ratio	Pol % Cane	Juice Purity	Glucose Ratio
0	13.59	84.2	9.08	—	—	—
1	14.21	85.5	8.27	14.18	83.3	8.76
2	14.18	82.9	8.21	14.96	84.7	6.91
3	13.68	82.0	8.30	14.22	82.9	8.37
4	13.13	79.7	11.27	12.26	82.2	10.15

Although the sampling fluctuations were more marked than in experiments 2 and 3, the general trend of the results was similar, and suggests that spraying of cut cane will retard deterioration.

EXPERIMENT 5.—EFFECT OF TOPPING STANDING CANE.

In order to provide forage for animals or cuttings for planting, planters sometimes top standing cane in the outer portions of fields they are about to harvest. In order to determine the maximum delay which can elapse without loss between the topping and the milling, fourteen rows of cane across a bed were topped on one day and one row crushed and analysed on each day over a fortnight. Fourteen rows in an adjoining bed were milled and analysed as a control, topping and harvesting being carried out on the same day as the particular row was milled. The results appear in Table IV and Figure II presents the straight regression lines which best fit the observations.

TABLE IV.

Effect of Topping on Cane Quality when Harvest is Delayed.

Freshly Topped and Harvested			Topped Prior to Harvest			
Pol % Cane	Juice Purity	Glucose Ratio	Days After Topping	Pol % Cane	Juice Purity	Glucose Ratio
14.44	89.0	4.66	0	14.26	89.1	4.50
14.67	89.0	4.56	1	14.24	88.1	4.67
14.95	88.2	4.82	2	14.29	88.1	4.61
14.20	87.0	5.05	3	14.68	87.7	5.19
13.75	88.0	4.71	4	13.76	86.9	4.93
13.72	88.2	4.92	5	13.25	87.4	4.81
14.80	88.2	4.86	6	13.87	87.1	5.07
15.21	88.4	4.87	7	13.40	86.8	4.74
13.85	89.0	4.38	8	12.70	87.8	4.49
13.97	89.7	4.63	9	13.33	85.4	5.57
14.64	88.7	4.87	10	12.21	87.1	5.33
14.23	87.8	5.33	11	12.59	84.6	6.23
14.47	87.4	5.36	12	12.59	85.0	6.11
14.71	88.2	5.91	13	12.50	85.8	7.79

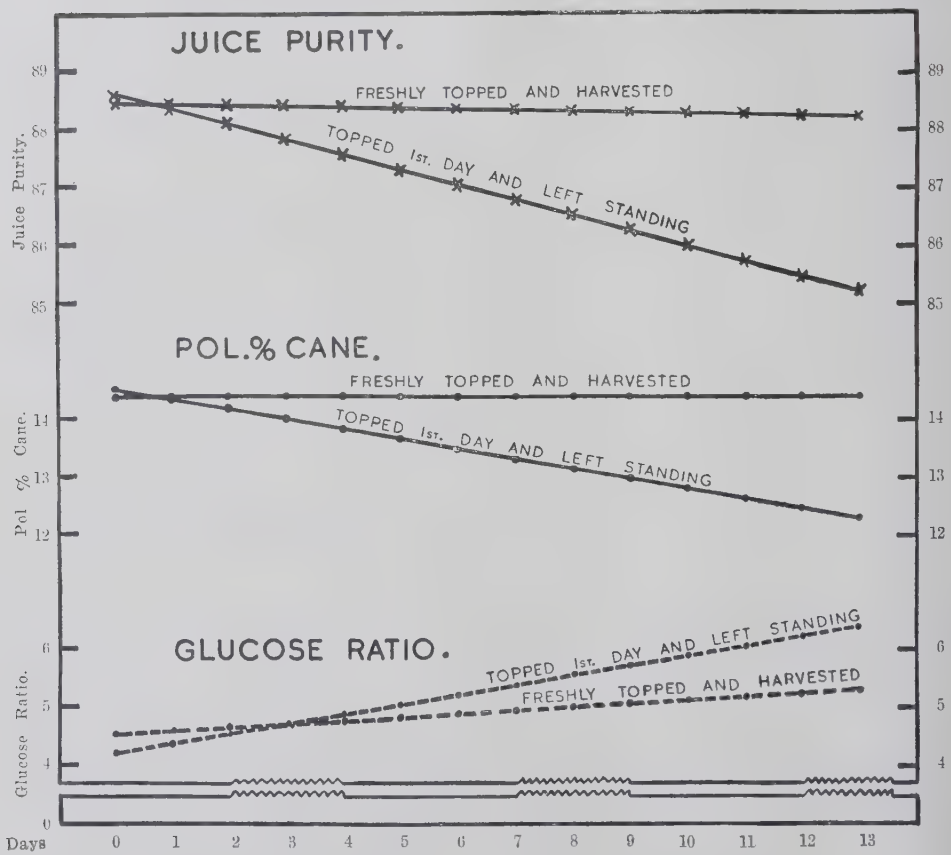

FIG. II.—Topped Cane must be Milled Without Delay.

It is clear that topping should only be done when it is certain that the cane can be milled within five days.

EXPERIMENT 6.—EFFECT OF DELAYED MILLING ON CANE WHICH HAS BEEN (a) TOPPED AND LEFT STANDING; (b) BURNT AND LEFT STANDING; (c) BURNT, BUNDLED AND EXPOSED TO THE WEATHER; (d) BURNT, BUNDLED, WATERED HOURLY AND EXPOSED TO THE WEATHER.

Comparable and contiguous beds of the same variety were

(a) Topped, harvested and milled daily;

(b) Topped one day, left standing and samples milled daily;

(c) Burnt and left standing, a sample being milled daily;

(d) Burnt, cut, bundled and left exposed on the dam;

(e) Treated as in (d) but the bundles watered hourly from 7 a.m. through 4 p.m.

The results are shown in Table V and in Figure III the straight regression lines which best fit the observed data are presented.

It should be noted that rain fell on every day during the progress of this experiment and that a total of 10.48 in. was recorded. In consequence, the beneficial effects of hourly watering were not as obvious as might be expected in the normal dry harvesting weather, for the 'unwatered' canes had liberal waterings with rain, but even under these conditions the watering appears to have delayed deterioration and in view of the results from total immersion in Experiments 2 and 3, it would seem advisable that cut cane should be watered whenever long delays occur between cutting and milling.

This test confirms Experiment 5 and suggests that cane should only be topped for planting material or fodder if it is going to be *milled* within five days.

The experiment also indicates rather definitely that if more cane is burnt than can be milled it should be cut as soon as possible, *i.e.* it is inadvisable to burn more cane than can be milled without delay but it is still worse to burn more cane than can be cut without delay.

TABLE V.

The Effect of Delayed Milling on Cane Treated in Different Ways.

Days After Start of Expt.	Cut and Milled Fresh			Topped and left Standing			Burnt and left Standing			Burnt, Bundled and Exposed to the Weather			Burnt, Bundled, Watered Hourly & Exposed to the Weather		
	Pol % Cane.	Juice Purity.	Glucose Ratio.	Pol % Cane.	Juice Purity.	Glucose Ratio.	Pol % Cane.	Juice Purity.	Glucose Ratio.	Pol % Cane.	Juice Purity.	Glucose Ratio.	Pol % Cane.	Juice Purity.	Glucose Ratio.
0	12.51	84.4	10.31	12.51	84.4	10.31	12.51	84.4	10.31	12.51	84.4	10.31	12.51	84.4	10.31
1	12.35	84.9	10.65	13.05	85.9	11.23	12.54	85.4	11.36	12.84	85.4	8.38	12.71	86.0	10.27
2	12.34	85.3	10.49	12.74	85.0	10.14	11.36	84.7	10.53	11.41	82.5	10.50	13.56	85.8	8.76
3	11.48	84.2	12.09	11.64	85.1	10.32	11.12	83.4	12.84	10.35	84.1	8.26	10.72	85.1	9.69
4	11.50	84.0	12.68	11.37	84.5	11.77	10.14	81.1	15.89	11.18	84.6	10.03	10.78	85.5	9.99
5	12.04	85.7	10.86	10.99	85.9	10.20	10.35	81.7	14.76	10.59	83.8	10.55	10.90	84.2	10.76
6	11.42	85.4	10.88	11.45	84.2	10.53	10.27	81.1	12.89	11.43	83.1	9.77	11.35	82.9	10.91
7	11.56	86.4	9.44	11.77	84.7	8.91	9.45	80.7	15.71	10.48	80.0	11.56	10.52	80.8	11.62
8	11.44	87.6	9.23	9.89	82.2	12.69	8.87	78.8	15.87	10.14	81.5	10.50	9.90	81.5	11.99
9	10.91	85.4	9.84	9.67	80.5	13.50	8.30	75.4	15.57	9.20	79.2	11.96	9.31	79.4	14.04
10	11.67	86.2	11.19	9.68	83.4	11.79	7.79	74.2	18.47	9.10	77.2	15.27	9.65	79.4	15.97
11	11.37	85.6	11.61	9.63	82.2	12.30	7.94	73.1	20.79	8.64	75.5	20.44	9.43	77.9	15.76
12	11.32	85.8	9.53	10.26	80.6	10.58	8.11	72.7	17.75	8.56	74.2	19.70	9.05	77.9	19.33
13	10.92	86.9	10.01	8.67	75.9	15.03	7.96	70.6	18.87	8.27	73.2	21.26	8.27	74.4	20.24

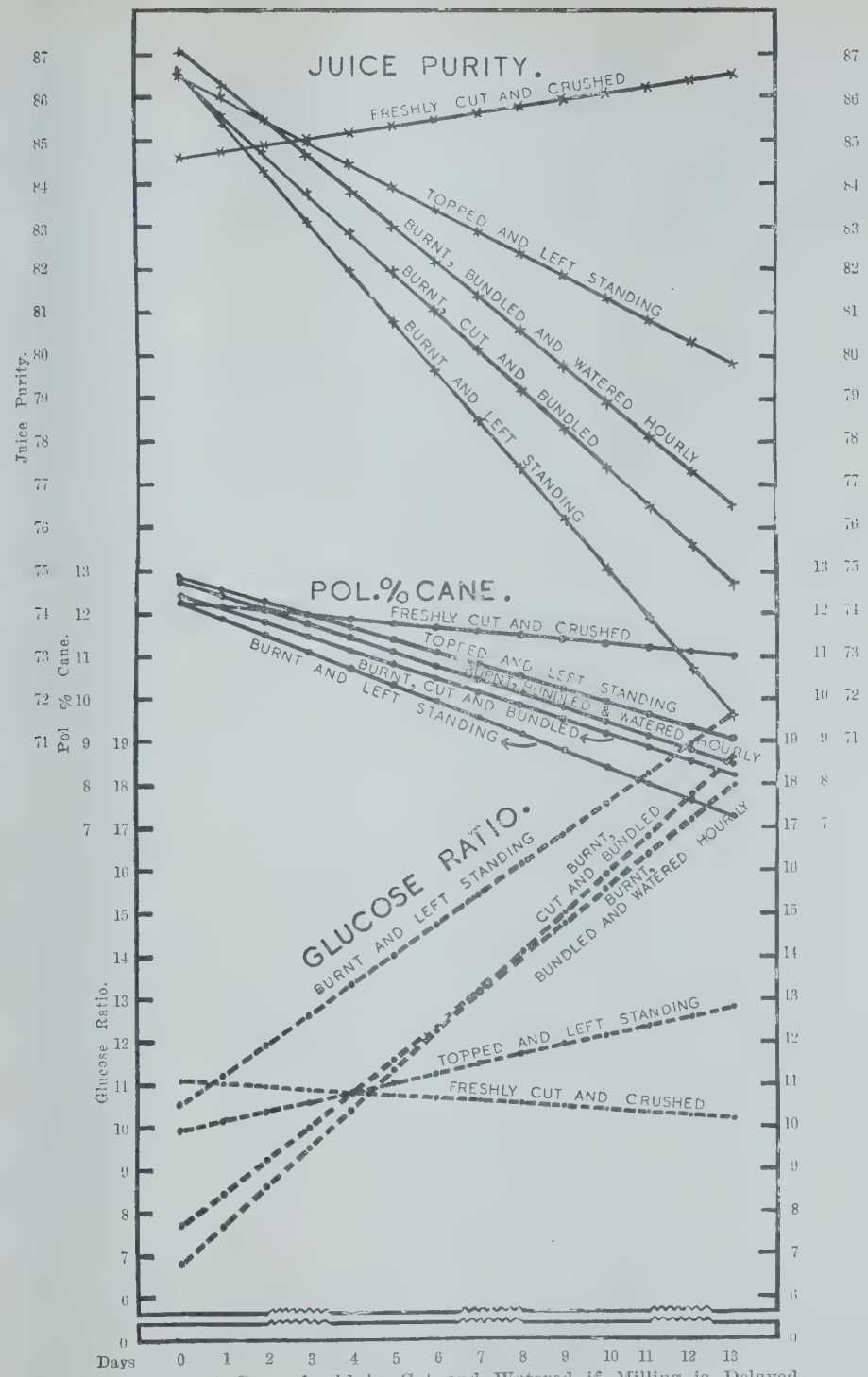
JUICE PURITY.
FRESHLY CUT AND CRUSHED
TOPPED AND LEFT STANDING
BURNT, BUNDLED AND WATERED HOURLY
BURNT, CUT AND BUNDLED
BURNT AND LEFT STANDING
POL.% CANE.
FRESHLY CUT AND CRUSHED
TOPPED AND LEFT STANDING
BURNT, BUNDLED & WATERED HOURLY
BURNT, CUT AND BUNDLED
BURNT AND LEFT STANDING
GLUCOSE RATIO.
BURNT AND LEFT STANDING
BURNT, CUT AND BUNDLED
BURNT, BUNDLED AND WATERED HOURLY
TOPPED AND LEFT STANDING
FRESHLY CUT AND CRUSHED
Juice Purity.
Pol % Cane.
Glucose Ratio.
Days
0 1 2 3 4 5 6 7 8 9 10 11 12 13

FIG. III.—Burnt Cane should be Cut and Watered if Milling is Delayed.

Conclusions.

As stated in the Introduction, these experiments do not constitute a complete study of the factors affecting cane quality and the deterioration of cut cane, but the problem has been studied in most cane countries and the indications from these few tests are in general conformity with those obtained by other investigators.

Repetition of some of this work is planned for the future and it would be unwise to be too positive until further confirmation is available, but the following suggestions are offered in the meantime :

1. Two joints of cane should be lopped off with the leaf-crown whether or not it is intended to use the 'tops' for planting purposes.
2. Cutters should be instructed not to include water-shoots, or suckers, under four feet in length in their cane bundles and longer canes of this type should be topped extra deeply, *i.e.* several joints of cane should be lopped off with the leaf-crown.
3. Cane cutters should be taught to throw their cane in the heaps and the 'cane bands' (leaf-crowns used for tying the bundles of cane) apart, and loaders instructed not to load any 'cane bands' which may be in the heaps of cane.
4. Burning, cutting and milling should be organised so that the minimum delay occurs betweeen the three operations.
5. In case of unavoidable delays all burnt cane should be cut and piled, for deterioration under these conditions will be slower than if the cane is left burnt and standing.
6. Cut cane will keep best if immersed in water but as this is hardly practicable, the alternative of frequent wetting should be adopted. This practice and that of shading have been recommended abroad but in most countries the difficulties are almost insurmountable. In British Guiana, with a navigation canal on three sides of every field, the obstacles are more easily overcome and every estate should have a pump or pumps for spraying cut cane on the dambeds at week-ends or when there are breakdowns.
7. Cane for harvest should not be topped for the provision of fodder or planting material unless it can be got through the mill within five days of topping.

THE VARIETY AND FERTILIZER POSITION OF THE SUGAR INDUSTRY, VIII.

By

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Sugar Agronomist and Plant Breeder.

VARIETAL COMPOSITION OF THE 1942 HARVESTS.

Table I and Figure I, compiled from returns kindly furnished by the sugar estates, show the relative importance, by area, of the varieties to be reaped in 1942. No variety returns are available from the small cane farmers who supply about two per cent. of the sugar output, but it is known that approximately forty per cent. of their production is in P.O.J. 2878 and Diamond 10, the remainder being D. 625.

TABLE I.

Percentage Distribution of the Varieties to be Reaped in 1942.

Variety.	Total English Acres in the Colony.	Percentage			
		in West Demerara.	along Demerara River Banks.	in East Demerara.	in Berbice.
P.O.J. 2878	47,268.41 (68.8%)	12.2	8.1	30.0	49.7
Diamond 10	19,310.63 (28.1%)	22.1	51.5	13.9	12.5
Other canes	2,104.20 (3.1%)	6.6	61.2	8.5	23.7
	68,683.24 (100.0%)				

There is an increase of 3,582 acres in the total area to be reaped, as compared with 1941, and the present figure is the highest since 1920. In that year, with a total of 69,532 acres under cane, the Colony exported 83,765 tons of sugar. This year's exports are expected to reach 200,000 tons, *i.e.* the yield per acre has been more than doubled since 1920.

The area in P.O.J. 2878 has expanded still further while that in Diamond 10 has continued to contract.

The campaign for the elimination of D. 625 and 'Mixed' plantings has borne such fruit that these items now occupy less than 0.4% each of the acreage.

"Other canes" have covered somewhat larger areas each year since 1940 and are likely to be further extended. This item at present includes :

504	acres of	D. 166/34	150	acres of	D. 49/30
404	„ „	S.C. 12/4	110	„ „	D. 66/30
252	„ „	D. 625	85	„ „	D. 450/33
186	„ „	Co. 213	52	„ „	Co. 419
157	„ „	D. 456/33			

Table II shows the varietal changes that have taken place in recent years.

TABLE II.

Comparison of Areas Under Various Canes in British Guiana, 1935-1942.

Variety.	Per Cent. of Total Area in the Colony.							
	1935	1936	1937	1938	1939	1940	1941	1942
D. 625	55.4	44.6	33.0	20.6	8.0	2.8	0.6	—
"Mixed"	12.6	12.7	8.8	4.0	0.8	0.6	0.2	—
Diamond 10	22.7	29.4	36.6	41.3	43.5	37.1	31.1	28.1
P.O.J. 2878	4.7	9.7	19.2	31.7	45.7	57.6	66.0	68.8
Other Canes	4.6	3.6	2.4	2.4	2.0	1.9	2.1	3.1

CYCLE AGE OF THE 1942 CROPS.

The returns show that, of the area to be harvested in 1942, there are :

29.4% plants	15.5% 3rd ratoons
23.7 „ 1st ratoons	5.6 „ 4th „
24.5 „ 2nd „	1.3 „ 5th „

COMMERCIAL YIELDS IN 1941.

Table III shows the areas of plants, first, second and third ratoons reaped from each variety during 1941 and the mean yields, etc., obtained.

As usual, P.O.J. 2878 has outyielded Diamond 10, the average increment on a four-crop cycle last year being one-third of a ton of sugar per acre.

No other cane was reaped on a really large scale but it may be said that :

There is no reason for revising the previous advice that S.C. 12/4 should be discarded;

On the area reaped, D. 66/30 has done about as well as P.O.J. 2878;

D. 166 34 is maintaining the standard indicated by the variety trial plots.

FERTILIZERS IN 1941.

Table IV is adapted from the Reports of the Comptroller of Customs and shows the fertilizer imports for the past ten years.

The 1940 imports of nitrogenous fertilizers were in excess of requirements and there was a decline in 1941. The two years, however, averaged 12,747 tons per annum, a figure well above the mean. War conditions affected the source and kind of fertilizer used and granular aero-cyanamide appeared for the first time in quantity, 5,000 tons being imported.

Limestone imports showed a marked rise in 1941 to a figure 4,000 tons above the 10-year mean. This is partly attributable to the more widespread use of limestone and partly to its being used on very acid lands which normally receive basic slag.

Phosphatic and potassic fertilizers are normally imported from continental Europe. This source being now cut off, the imports for 1941 were very low and, as mentioned above, there was some tendency to use pulverised limestone when basic slag could not be obtained.

As may be expected, the cost per ton of the various fertilizers is rising rapidly, that of nitrogenous salts, for example, having more than doubled since 1939.

The sugar estates have kindly supplied details of the various manures used in 1941 and the data for 1939-1941 are summarised in Table V and Figure II.

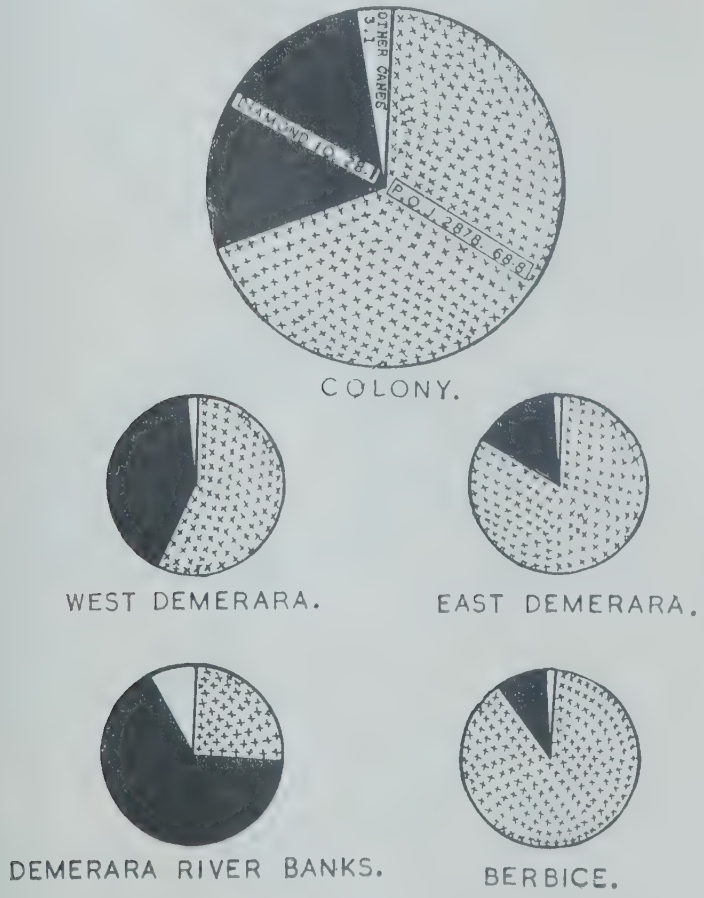

FIG. I.

Relative Varietal Composition of the Cane Areas to be Harvested in British Guiana in 1942.

TABLE III.

Commercial Yields Under Estate Conditions, 1941.

Variety.	Acres Harvested.	Crusher Juice		Fibre % Cane.	Tons 96° Sugar per Acre. *
		Pol. %	Purity.		
		Plant	*Canes.*		
P.O.J. 2878	11,322.6	14.34	82.25	—	3.86
D. 66/30	32.3	15.12	84.57	—	3.85
D. 166/34	128.9	14.74	82.07	12.20	3.78
S.C. 12/4	135.6	—	—	—	3.68
D. 49/30	34.3	14.20	85.09	12.80	3.52
Diamond 10	3,296.5	14.18	81.18	—	3.24
Co. 419	3.2	12.23	78.90	—	2.86
D. 450/33	6.6	14.67	81.37	12.00	2.75
D. 456/33	7.9	10.61	77.18	12.00	2.61
D. 32/35	1.1	—	80.30	12.00	2.57
Co. 213	8.6	14.12	82.08	—	2.31
		First	*Ratoons.*		
D. 166/34	4.4	15.38	82.14	12.50	3.45
Co. 213	47.6	11.90	78.54	13.30	3.40
D. 66/30	13.3	15.03	84.71	—	3.33
D. 602/22	1.6	—	81.00	12.50	3.23
P.O.J. 2878	11,208.6	14.25	81.53	—	3.19
S.C. 12/4	254.9	—	—	—	3.00
Diamond 10	5,740.2	14.16	82.11	—	2.95
D. 450/33	44.9	11.25	83.39	12.50	2.64
D. 49/30	90.7	13.92	81.92	12.80	2.56
D. 456/33	68.5	14.28	82.40	12.50	2.55
D. 295/33	5.3	—	85.50	12.50	2.38
		Second	*Ratoons.*		
D. 456/33	2.6	14.84	84.30	—	3.82
P.O.J. 2878	8,575.6	13.38	79.18	—	2.86
D. 450/33	3.7	—	82.40	13.00	2.71
D. 49/30	24.0	15.37	87.16	12.80	2.68
Diamond 10	6,369.1	13.90	81.20	—	2.55
D. 66/30	73.3	15.26	86.73	13.28	2.36
S.C. 12/4	114.6	—	—	—	2.36
D. 75/30	2.6	—	—	—	2.28
D. 602/22	6.3	—	81.30	13.00	2.22
Co. 213	4.2	14.21	80.74	12.09	2.14
		Third	*Ratoons.*		
D. 66/30	34.7	14.17	83.40	—	3.19
P.O.J. 2878	5,925.5	14.83	83.10	—	2.74
Diamond 10	2,983.3	13.64	78.82	—	2.67
S.C. 12/4	40.0	—	—	—	2.27
D. 602/22	2.1	—	80.80	13.50	1.66

* Undue importance should not be attached to the order of merit when only a small acreage has been harvested.

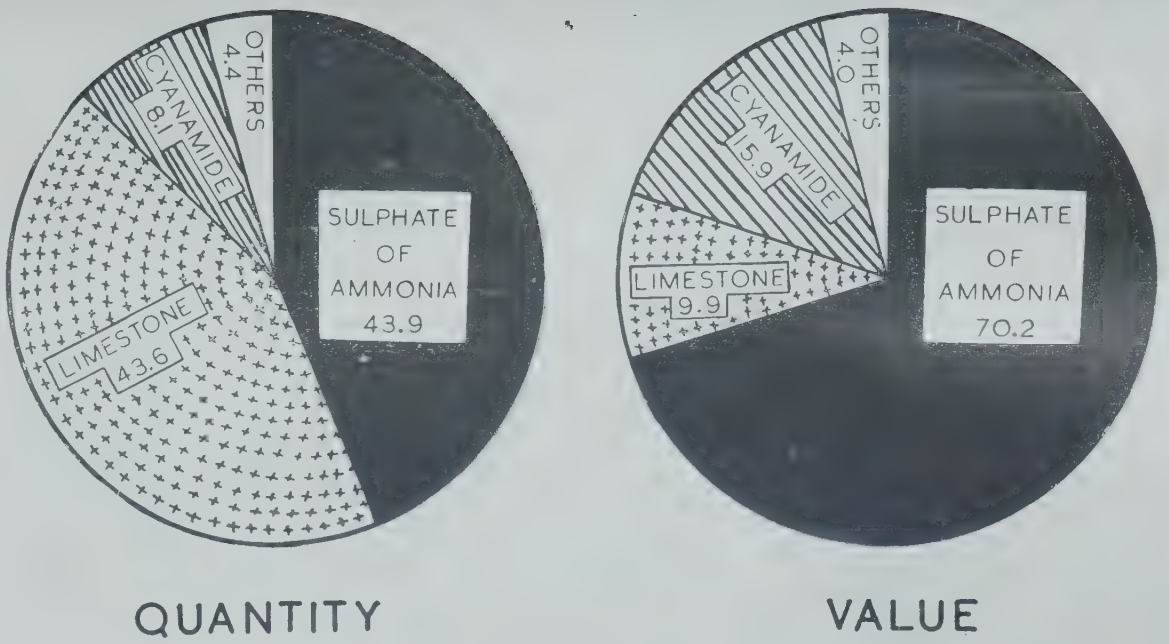

FIG. II.

Relative Quantities and Values of Ferilizers Used on British Guiana Sugar Estates in 1941.

TABLE IV.

Fertilizers Imported into British Guiana in Recent Years.

Years.	Nitrogenous Fertilizers (almost entirely Sulphate of Ammonia).			Manurial Lime and Limestone.			Other Fertilizers (mainly Superphosphate and Basic Slag with some Sulphate of Potash).			Total Imports.	
	Tons.	Value $	Value per Ton, $	Tons.	Value $	Value per Ton, $	Tons.	Value $	Value per Ton, $	Tons	Value $
1932	8,294	254,726	30.71	4,366	42,071	9.64	2,619	54,281	20.73	15,279	351,078
1933	7,681	263,456	34.30	4,749	42,569	8.96	2,937	76,617	26.09	15,367	382,642
1934	7,727	248,185	32.12	4,306	38,524	8.95	2,168	48,735	22.48	14,201	335,444
1935	10,268	333,732	32.50	4,917	39,521	8.04	3,096	60,812	19.64	18,281	434,065
1936	9,963	334,556	33.58	3,786	28,453	7.52	2,639*	52,092*	19.74	16,388	415,101
1937	11,171	367,689	32.91	4,537	33,342	7.35	2,537*	49,509*	19.51	18,245	450,540
1938	10,205	356,068	34.89	3,755	27,131	7.23	2,199*	46,821*	21.29	16,159	430,020
1939	11,720	401,847	34.29	4,795	33,609	7.01	2,033*	42,838*	21.07	18,548	478,294
1940	17,179†	1,000,526†	58.24	5,585	41,915	7.50	1,809*	54,429*	30.09	24,573	1,096,870
1941	8,315†	592,555†	71.26	9,012	70,934	7.87	203	6,893	33.96	17,530	670,382
Mean	10,252	415,334	40.51	4,981	39,807	7.99	2,224	49,303	22.17	17,457	504,444
% of Mean Annual Imports:	58.73	82.34		28.53	7.89		12.74	9.77			

*Includes
1936: 152 tons of Sulphate of Potash, valued at $ 6,652 or $43.76 per Ton.
1937: 160 " " " " " " " $ 6,929 or $43.31 per Ton.
1938: 234 " " " " " " " $10,196 or $43.57 per Ton.
1939: 96 " " " " " " " $ 4,155 or $43.28 per Ton.
1940: 42 " " " " " " " $ 2,795 or $66.55 per Ton.

†Includes:
1940: 1,001 tons of Nitrate of Soda, valued at $ 50,979 or $50.93 per Ton.
1941: 5,000 " " Cyanamide, " " $381,873 or $76.37 per Ton.

TABLE V.

Values and Quantities of Fertilizers used on British Guiana Sugar Estates, 1939—1941.

Fertilizer.	Value, $			Per cent. of Total Value.			Per Ton, $			Quantity, Tons.			Per cent. of Total Quantity.		
	1939	1940	1941	1939	1940	1941	1939	1940	1941	1939	1940	1941	1939	1940	1941
Sulphate of Ammonia	424,614.86	568,986.47	606,229.04	81.9	77.4	70.2	40.59	58.37	70.65	10,460.32	9,747.12	8,580.58	62.1	55.8	43.9
Calcium Cyanamide	...	...	137,078.74	...	...	15.9	...	...	86.70	...	...	1,580.99	...	...	8.1
Nitrate of Soda	...	55,922.71	13,654.17	...	7.6	1.6	....	63.87	65.19	...	875.53	209.45	...	5.0	1.1
Basic Slag	31,208.39	34,722.53	6,169.98	6.0	4.7	0.7	22.46	31.76	29.94	1,389.25	1,094.85	206.10	8.3	6.3	1.0
Superphosphate	14,107.18	12,649.56	11,748.23	2.7	1.7	1.3	21.75	33.68	32.53	648.60	375.57	361.10	3.9	2.1	1.8
Limestone	41,233.48	53,571.86	85,394.82	8.0	7.3	9.9	9.85	10.34	10.04	4,186.97	5,179.05	8,507.45	24.9	29.7	43.6
Sulphate of Potash	7,097.87	4,494.21	...	1.4	0.6	...	48.28	59.37	...	147.00	75.70	...	0.8	0.4	...
Rock Phosphate	...	2,680.70	1,517.68	...	0.4	0.2	...	30.66	28.77	...	87.42	52.75	...	0.5	0.3
Miscellaneous	57.83	1,670.87	2,087.62	...	0.3	0.2	...	...	...	0.92	29.95	32.90	...	0.2	0.2
TOTAL	518,319.52	734,748.91	863,880.28	100.0	100.0	100.0	...	...	...	16,833.06	17,465.19	19,531.32	100.0	100.0	100.0

THE CAMERON-WILLIAMS SYSTEM FOR CANE CULTIVATION IN BRITISH GUIANA.

BY

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AND

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Introduction.

Most of the British Guiana sugar soils are heavy, acid clays lying below sea-level, without natural slope, and subject to an annual rainfall of 80—100 inches. The frontland subsoils are less acid than the surface layer and are heavily charged with salts.

The individual fields are surrounded by canals on all sides and cut up by internal drainage ditches into beds. To facilitate drainage, the rows of cane normally run across the beds and this factor, together with transport difficulties in moving heavy tackle in punts or on mud dams (there being no natural stone), have almost entirely precluded the use of mechanical tillage. Light tractors and ploughs do not give efficient service in such heavy compact clays, and the dependance on hand labour, tilling to a depth of one foot only, is the general rule. Even at harvest, cutters fetch all the cut cane on their heads to the peripheral beds of the fields, more often than not having to cross a number of internal drainage ditches *en route.*

On the other hand, pen manure and filterpress cake are hardly used, much of the organic matter produced is destroyed by preharvest burning, and there is no system of incorporating the residue to any depth with the soil.

Lack of cultivation, lack of organic matter and a high water table render the second foot of soil largely inert and the crop is mainly produced by the first foot.

A common example of the difference in fertility between the first and the second foot of soil is seen when an old drain is filled in with topsoil from the surrounding area. In such circumstances, unusually vigorous growth on the site of the filled-in drain has been observed to persist for many years, and even after the field has been flood-fallowed and replanted. Conversely, the growth is poor on the area which has been deprived of its topsoil.

A system of cultivation has been worked out at the Sugar Experiment Station which permits bringing the second foot of soil into tilth. Its long-term effects have not yet been measured, but the early results are very promising and, since the process is necessarily slow, it is described below so that the estates may make an early start.

FIG. I.—Deep drills dug and field ready for second portion of flood-fallow period.

FIG. II.—After the second portion of the flood-fallow period a germination like this is to be expected on the new rows.

Detail of the Operations.

Flood-Fallow Period.

1. Release the water when the old stumps and soil have softened.
2. Fill in all the old drains except the centre collector (fourfoot), but avoid using all the best topsoil from the bed in this operation.
3. Dig a drill 2 ft. deep and 2 ft. wide on the site of every alternate old row, measuring the depth from the general soil level and not from the high crown of the old row.
4. Spread the soil from any two drills evenly over the bed which lies between them.
5. Reflood the field for at least two months.

Plant Canes.

6. Release the flood-water and stick the cuttings into the new soil without any further tillage.
7. Cultivate as usual, but only alternate inter-rows (banks) will be available for forking, etc., as the others will be occupied by the deep drills, and only the centre collector (fourfoot) will be dug or cleaned.
8. Place trash and residue from plant cane harvest in the deep drill.

First Ratoons.

9. Fork the bank and mould the cane, forming a shallow gutter.
10. Place trash and residue from the first ratoon harvest in the deep drill.

Second Ratoons.

11. Deepen the fork-mould gutter in the worked bank still further.
12. Place the trash and residue from the second ratoon harvest in the deep drill.

Third Ratoons.

13. Before the cane has grown inconveniently high, dig the fork-drill gutter to the full depth of 2 ft. (corresponding to the depth of the first deep drill) and place the soil removed on top of the trash from the three previous harvests in the deep drill.
14. Place the trash and residue from the third ratoon harvest in the new deep drill.

Flood-Fallow Period.

15. Release the water when the old stumps and the soil have softened.

16. Level the top of every alternate old row and place the roots, stumps, etc. on top of the third ratoon trash in the open drill.

17. Dig a drill 2 ft. by 2 ft. at the side of the old rows which have been levelled (operation 16), completing the filling up of the open drills and the ones which had been partly filled by operation 13.

18. Reflood the field for about three months.

Plant Canes.

19. Release the water, plant and repeat operations as explained above.

When this system is used the rows and beds must always run from cross canal to cross canal and harvesters will not have to cross drainage ditches in fetching cane to the dam beds. As Figures I and II show, the field has the appearance of being laid out in a series of small 'Dutch' beds, each bed carrying two long rows. In the centre of the field the beds are cut at right angles by a 'fourfoot' running from middle-walk to side-line (main drainage canal) and emptying into the latter.

Figure III assumes an 'English-bed' layout at the start. With such, the usual drains from middle-walk to side-line, except the centre 'fourfoot,' can be filled in, for the deep drills every 12 ft. will provide sufficient drainage. If the field be already laid out in 'Dutch' beds, it will be necessary to dig two drills on each 37 ft. bed, parallel with the existing drains, and spaced 12 ft. apart and from each drain, thus making the original bed into three beds, each one Dutch rod wide. On each of these small beds two long rows of cane are planted.

Perhaps the simplest procedure for starting the system, where tractors are available, is to plough the entire field to a level state, take out the first foot of the deep drill with a double mouldboard plough, and the second foot by hand.

Advantages of the System.

The advantages claimed for the system are :

1. It ensures the complete turning over of the soil, *to a depth of two feet,* every crop cycle;

2. It permits the thorough incorporation of organic matter, limestone, etc., to a depth of two feet;

3. It will eventually provide two feet of fertile soil instead of the one foot in which most of the cane is grown at present;

4. The deep drills 12 ft. apart will provide more efficient drainage than the present drains spaced 37 ft. apart;

5. More efficient irrigation can be provided, a saving in pumping made and less water used, if water is run into the drills by gravity and held there for some time, than if the whole field is flooded over as at present, and, further, the roots will go down rather than up in search of water and, if the drought forces a cessation of irrigation, the crop will be in a better position than if its roots had been brought to the surface;

6. The eventual improvement in tilth and the use of long rows may be expected to permit the widespread adoption of mechanical tillage;

7. By eliminating the usual drains and using a long row, the actual length of planted row per acre is increased by about 8 per cent.;

8. With the savings effected on digging drains and by having only one bank to 'work' during the cycle, the cost of the system, over four crops, compares favourably with the present costs of cultivation where the land is half-banked and planted; it may well prove considerably cheaper when the improvement in tilth has taken effect and or mechanical tillage is adopted.

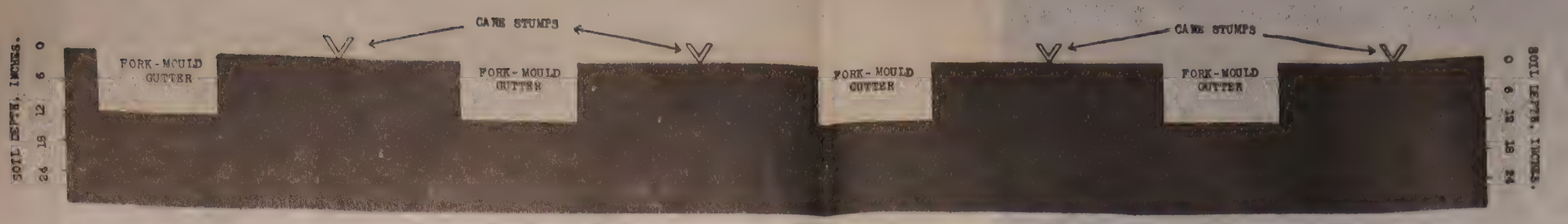
Summary.

A brief description is given of the layout of British Guiana cane fields and the reasons for the present dependence on hand labour are explained.

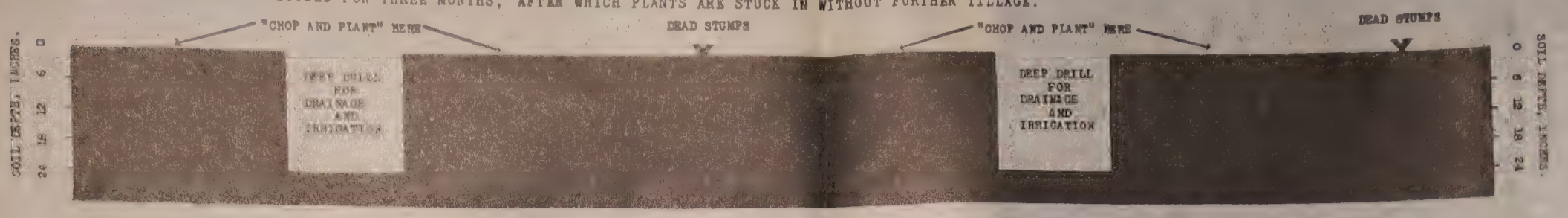
The disadvantages of shallow hand tillage on low-lying, heavy, badly-drained clays, without natural slope and subject to 90 inches of rain per annum are stressed. It is pointed out that preharvest burning, the almost complete neglect of organic manures, a high water table and the presence of large amounts of salts in the subsoils, worsen the position.

A method of hand cultivation is detailed and illustrated which it is claimed will create a fertile soil to a depth of two feet, instead of one foot as at present, provide more efficient drainage and irrigation, facilitate the incorporation of organic matter and amendments to a greater depth, and pave the way for the general adoption of mechanical tillage.

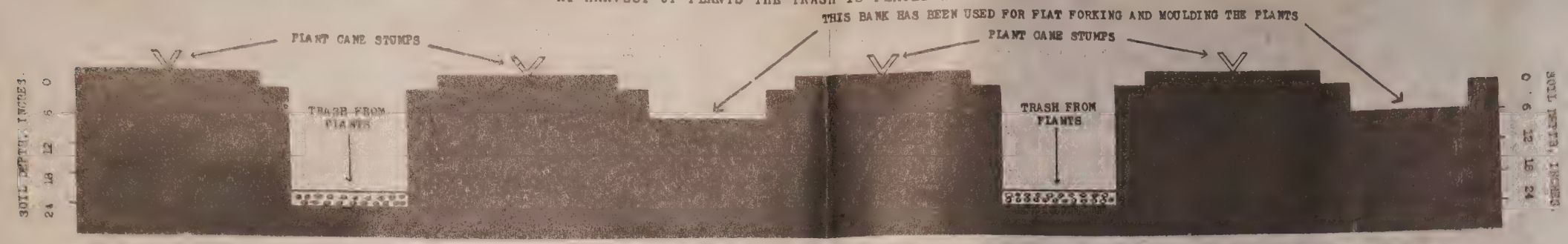
FIELD AFTER LAST HARVEST OF CYCLE, READY FOR FLOOD-FALLOWING



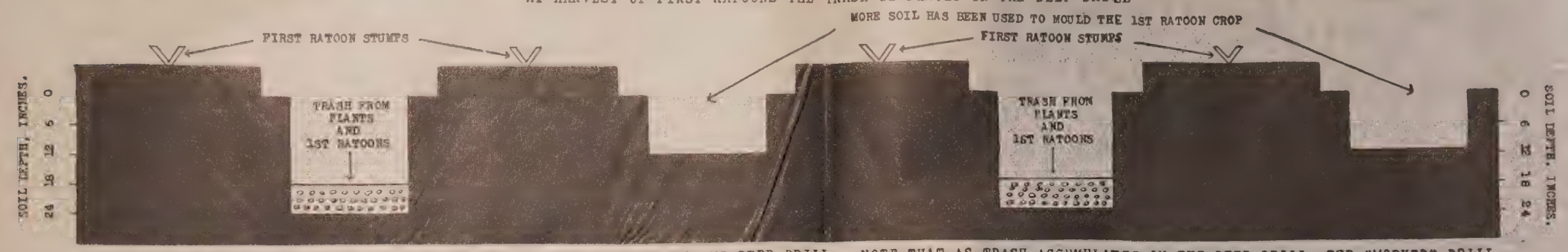
THE WATER IS DRAWN OFF DURING THE FLOOD-FALLOW AND DEEP DRILLS DUG AT EVERY OTHER OLD ROW, THE SOIL BEING PLACED IN THE FORK-MOULD GUTTERS. THE FIELD IS THEN REFLOODED FOR THREE MONTHS, AFTER WHICH PLANTS ARE STUCK IN WITHOUT FURTHER TILLAGE.


"CHOP AND PLANT" HERE
DEAD STUMPS
DEEP DRILL FOR DRAINAGE AND IRRIGATION
"CHOP AND PLANT" HERE
DEAD STUMPS
DEEP DRILL FOR DRAINAGE AND IRRIGATION
SOIL DEPTH, INCHES.
0 6 12 18 24

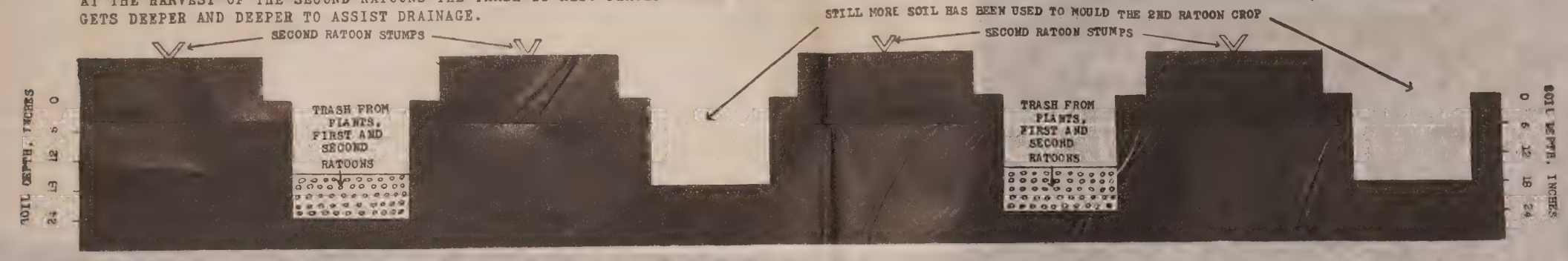
AT HARVEST OF PLANTS THE TRASH IS PLACED IN THE DEEP DRILL.


THIS BANK HAS BEEN USED FOR FLAT FORKING AND MOULDING THE PLANTS
PLANT CANE STUMPS
PLANT CANE STUMPS
TRASH FROM PLANTS
TRASH FROM PLANTS
SOIL DEPTH, INCHES.
0 6 12 18 24

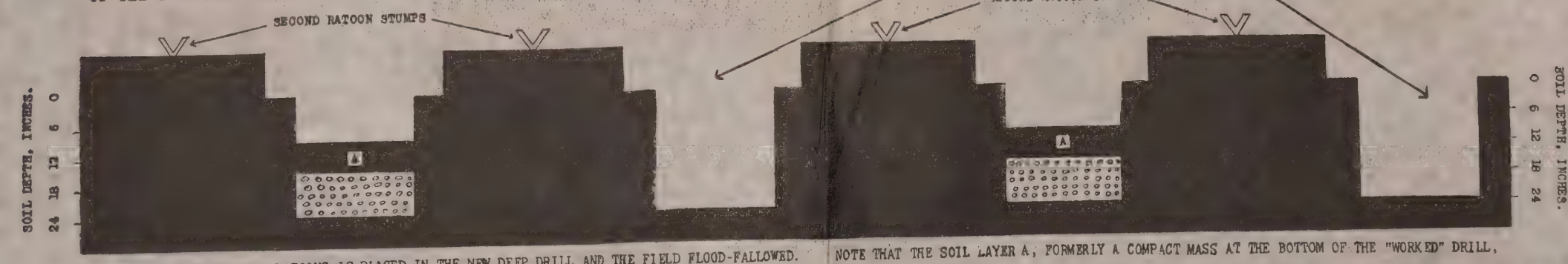
AT HARVEST OF FIRST RATOONS THE TRASH IS PLACED IN THE DEEP DRILL


MORE SOIL HAS BEEN USED TO MOULD THE 1ST RATOON CROP
FIRST RATOON STUMPS
FIRST RATOON STUMPS
TRASH FROM PLANTS AND 1ST RATOONS
TRASH FROM PLANTS AND 1ST RATOONS
SOIL DEPTH, INCHES.
0 6 12 18 24

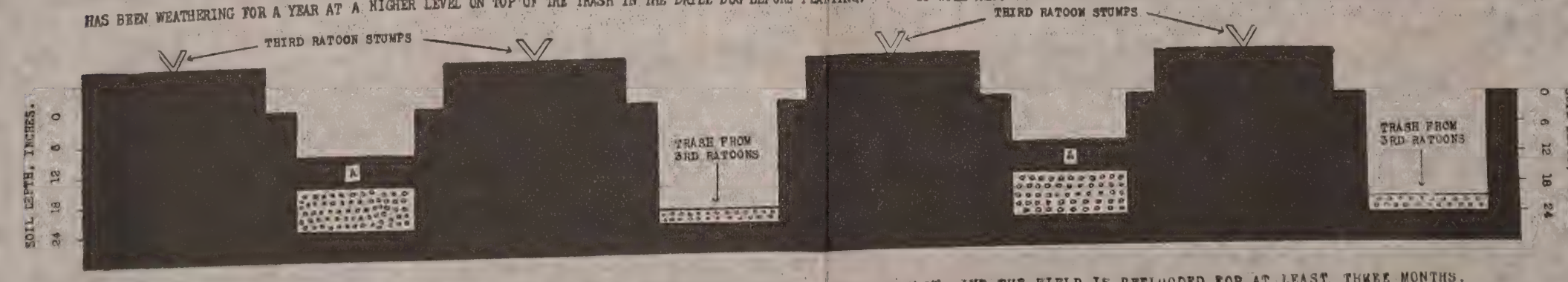
AT THE HARVEST OF THE SECOND RATOONS THE TRASH IS ALSO PLACED IN THE DEEP DRILL. NOTE THAT AS TRASH ACCUMULATES IN THE DEEP DRILL, THE "WORKED" DRILL GETS DEEPER AND DEEPER TO ASSIST DRAINAGE.


STILL MORE SOIL HAS BEEN USED TO MOULD THE 2ND RATOON CROP
SECOND RATOON STUMPS
SECOND RATOON STUMPS
TRASH FROM PLANTS, FIRST AND SECOND RATOONS
TRASH FROM PLANTS, FIRST AND SECOND RATOONS
SOIL DEPTH, INCHES.
0 6 12 18 24

EARLY IN THE GROWTH OF THE THIRD RATOONS THE LAST SIX INCHES OF SOIL IN THE BANK THAT IS BEING "WORKED" ARE TAKEN OUT AND PLACED ON TOP OF THE TRASH IN THE DEEP DRILL FROM THE THREE PRECEDING CROPS AT 'A'.



THE TRASH FROM THE THIRD RATOONS IS PLACED IN THE NEW DEEP DRILL AND THE FIELD FLOOD-FALLOWED. NOTE THAT THE SOIL LAYER A, FORMERLY A COMPACT MASS AT THE BOTTOM OF THE "WORKED" DRILL, HAS BEEN WEATHERING FOR A YEAR AT A HIGHER LEVEL ON TOP OF THE TRASH IN THE DRILL DUG BEFORE PLANTING. IT WILL ALSO RECEIVE THE FULL BENEFIT OF THE FIRST HALF OF THE FLOOD-FALLOW PERIOD.



AFTER ABOUT THREE MONTHS, THE WATER IS DRAWN OFF, A DEEP DRILL DUG AT EVERY OTHER OLD ROW, AND THE FIELD IS REFLOODED FOR AT LEAST THREE MONTHS. IN THE PREVIOUS CYCLE THE DEEP DRILL RECEIVED THE TRASH FROM THREE CROPS, THE "WORKED" DRILL THE TRASH FROM ONE CROP ONLY. THUS ALL THE ROOTS AND STUMPS AT THIS OPERATION SHOULD BE PLACED IN THE "WORKED" DRILL AS INDICATED BY ▦. AFTER THE FINAL THREE MONTHS, STICK IN PLANTS WITHOUT FURTHER TILLAGE AND "WORK" THE REMAINING BANK DURING THE COURSE OF THE CYCLE.

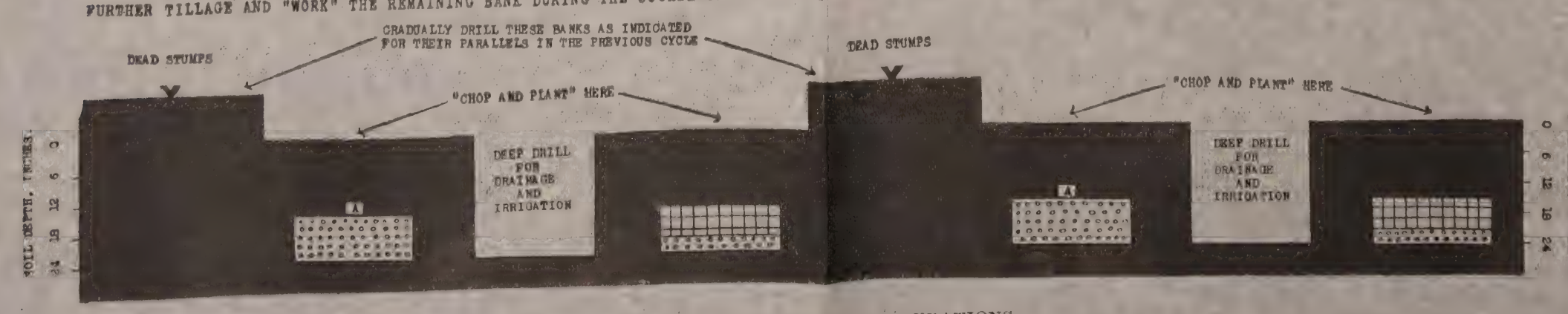

GRADUALLY DRILL THESE BANKS AS INDICATED FOR THEIR PARALLELS IN THE PREVIOUS CYCLE
DEAD STUMPS
DEAD STUMPS
"CHOP AND PLANT" HERE
"CHOP AND PLANT" HERE
DEEP DRILL FOR DRAINAGE AND IRRIGATION
DEEP DRILL FOR DRAINAGE AND IRRIGATION
A
A
SOIL DEPTH, INCHES.
0 6 12 18 24

FIG. III.—DETAIL OF FIELD OPERATIONS.
(Cameron—Williams System for British Guiana).

TRASH PUMP
PLANTS

CANE STUMPS
FURROW - MOULD GUTTER
TRASH FROM PLANTS
PLANT CANE STUMPS
FIRST RATOON STUMPS
TRASH FROM PLANTS AND 1ST RATOONS
SECOND RATOON STUMPS
TRASH FROM